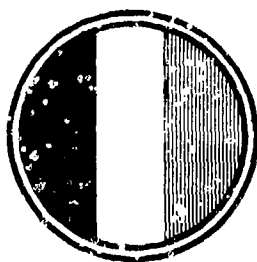


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# TRASANA

TECHNICAL REPORT NO. 3-78

TRASANA-TR-3-78-VOL-4

## FLIGHT PROFILE PERFORMANCE HANDBOOK

### VOLUME IV-AH-1S (COBRA)

Nathan H. /leek, Jr. Alan J. /olfe

AUGUST 1978

APPROVED FOR PUBLIC RELEASE;  
DISTRIBUTION UNLIMITED

DEPARTMENT OF THE ARMY  
US ARMY TRADOC SYSTEMS ANALYSIS ACTIVITY  
WHITE SANDS MISSILE RANGE  
NEW MEXICO 88002

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WARNING

Information and data contained in this document are based on the input available at the time of preparation. The results may be subject to change and should not be construed as representing TRADOC position unless so specified.

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PREPARED BY

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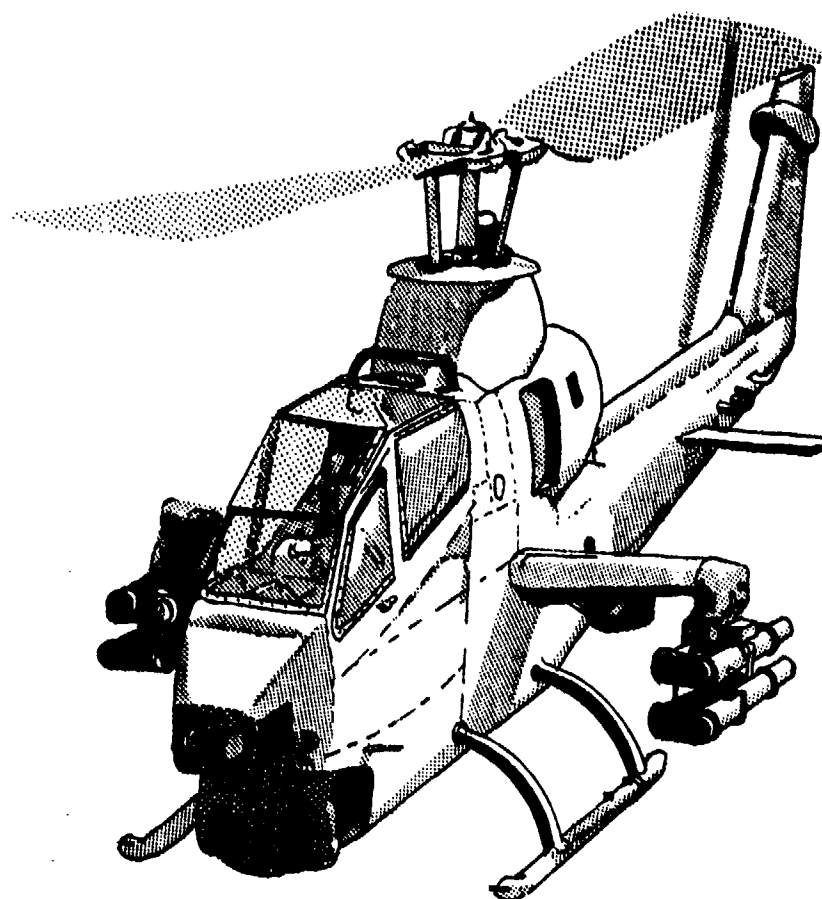


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**AH-1S COBRA**

## CHAPTER 1

### INTRODUCTION

#### 1. PURPOSE

The purpose for preparing this handbook series is fourfold: (a) to validate AH-1S performance data quickly, (b) to reduce the manpower and time to prepare accurate flight profiles, (c) to standardize performance data so that the analysis community can benefit from a single reference in conducting studies and (d) to provide a handbook that can be used for training in the mission profile planning area. ✓

#### 2. BACKGROUND

The AH-1S performance data contained in this Flight Profile Performance Handbook (FPPH) series was originally acquired as a data base for the Aircraft Mission Processing Simulation (AMPS) model. AMPS is a computer program developed by the Aviation Systems Analysis Branch of the US Army TRADOC Systems Analysis Activity (TRASANA) to support Cost and Operational Effectiveness Analyses (COEAs). AMPS generates detailed flight profiles for a wide variety of helicopter missions. The data was provided TRASANA by the Army Aviation Research and Development Command (AVRADCOM) and was the most accurate data available to AVRADCOM at the time of handbook publication. In structuring the data base for AMPS it was noted that the data, when properly organized, could provide a method of doing quick and simple flight profile simulations. This volume presents the AH-1S data and explains how it can be used.

#### 3. OBJECTIVES OF THE HANDBOOK

a. Data Validation. This volume of the handbook contains tables with the precise performance data and format required to develop flight profiles for computer simulations. Using the handbooks as a reference, the individual project manager (PM) will be able to quickly validate or update as required all associated data contained in the different tables. If this procedure is followed by the various PMs, support of Helicopter COEAs and other analyses can be efficiently implemented.

b. Flight Profile Development. Much of the manpower and time spent in preparing flight profiles for supporting aircraft COEAs is dedicated to look-up, correlation and validation of performance data. Once the procedure contained in this handbook is implemented, flight profiles can be easily prepared. What normally took one man 4 to 5 days to prepare can now be prepared in 3 to 4 hours.

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c. Standardization of Performance Data. Each of the PMs has been contacted by AVRADCOM to validate the performance data contained in each handbook in this series. Once each handbook is published, the data contained will be kept current as of the publication date. Since the requests for current information are constantly being forwarded to the PMs by analysis groups, this handbook can be a reference and assure a commonality in studies within the community.

d. Training for Planning Missions and Flight Profiles. For training purposes each handbook can stand alone. It is only a matter of following the example provided and applying the proper data to fit the flight profile desired. Although the example shown is simplistic, the methodology may be expanded to apply to any flight profile no matter how complex.

#### 4. OTHER VOLUMES

This handbook is one of a series that covers the helicopters in the US Army inventory. The complete set of handbooks and their subjects are:

- Volume I - FPPH Description
- Volume II - UH-60A (BLACKHAWK)
- Volume III - AH-1G (COBRA)
- Volume IV - AH-1S (COBRA)
- Volume V - YAH-64 (Advanced Attack Helicopter [AAH])
- Volume VI - OH-58C (KIOWA)
- Volume VII - CH-47 (CHINOOK)
- Volume VIII - CH-54 (TARHE)
- Volume IX - UH-1H (HUEY)

#### 5. GENERAL HANDBOOK DESCRIPTION

a. Performance Data. The data contained in these volumes is AH-1S performance data compiled from the results of actual experiments. It is not engineering data and is not intended to serve as a base for future helicopter construction or acquisition. The more mature the helicopter becomes, the less likely there will be a change in the basic performance data.

b. Handbook Organization. This volume is one of a series of volumes as identified in paragraph 4 above. Volume I is a description of the methodology used to develop the tables for each of the other volumes. This volume and all other volumes except Volume I provides a simplified flight profile example in Chapter 2. Chapter 3 provides an explanation of each of the five types of data tables contained in the handbook. The five types of tables deal with: (1) Basic Fuel Flow Data, (2) Delta Fuel Flow for Drag Data, (3) Ground Idle Fuel Flow Data, (4) Gross Weight Limits Data and, (5) Velocity Limits Data. Chapter 4 contains the actual tables to be used in developing flight profiles for 540 blades. Chapter 5 contains the tables to be used in developing flight profiles for 747 blades.

## 6. AH-1S BLADES DESCRIPTION

a. Today the majority of AH-1S helicopters are equipped with a rotor blade referred to as the 540 blade. This is a metal rotor blade designed with the original AH equipment. However, a fiberglass blade referred to as the 747 blade (or KAMAN Blade) has been designed to be an exact dynamic replacement for the 540 blade. Although the same size, it is however, of a different design and shape.

b. Testing has shown the 747 blade to have the following characteristics when compared to the 540 blade:

- (1) Improved hover performance.
- (2) Improved survivability.
- (3) Reduced radar and acoustic signatures.
- (4) Improved fatigue life.
- (5) Improved reliability and maintainability.

c. Although the 540 rotor blade AH-1S is used in all examples in this volume, the performance tables for both blades are included in this volume. As 540 blades are replaced by 747 blades in the field, the data in this handbook will permit development of flight profiles for either configuration.

## CHAPTER 2

### FLIGHT PROFILE EXAMPLE

#### 1. GENERAL

This chapter provides an example of how to develop a flight profile, albeit simple, that can be extended to cover any number of stops, loads and distances all depending on helicopter capability and fuel available.

#### 2. DISCUSSION

a. The main question this example of a flight profile will answer is, "Do I have enough fuel to fly the proposed mission?"

b. Suppose a pilot is to fly a simple support mission in an AH-1S helicopter that calls for flying (as shown in illustration 2-1) from point A (the air base), to point B (the holding area) to point C (the combat area) and return to A.

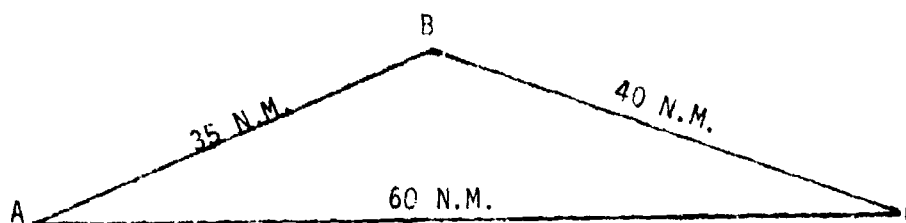


Illustration 2-1

c. The other information given is airspeed (AS) from A to B which is to be 70 knots (kts), from B to C 40 kts, and from C to A 60 kts. The AH-1S helicopter is to be flown at an ambient temperature of 15°C. The leg from A to B will be flown at 4,000 ft,\* while legs B to C and C to A will be at 3,000 ft. The ground elevations at A, B and C are all 2,000 ft. The mission plan also shows 10 minutes idle at A before takeoff, 15 minutes idle at B, 20 minutes Hover in Ground Effect (HIGE) at C and 5 minutes idle on returning to A for shut-down. The AH-1S will take off with a gross weight (GW) of 9,500 lbs at A and continue to carry this weight until leaving C to return to A, then the GW will be 8,500 lbs.

\*All altitudes are in reference to sea level.

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d. The flight plan is prepared by drawing up a table similar to Table 2-1 below. By filling in the blanks under fuel, it can be determined if the total is too large for the helicopter.

TABLE 2-1

Helicopter: AH-1S

Temperature: 15°C

LEG	DISTANCE N.M.	AS KTS	TIME		GW LBS	ALT FT	FUEL LBS
			MIN	HR			
Idle @ A	-	-	10	1/6	-	2000	
A - B	35	70	30	1/2	9500	4000	
Idle @ B	-	-	15	1/4	-	2000	
B - C	40	40	60	1	9500	3000	
HIGE @ C	-	-	20	1/3	9500	2000	
C - A	60	60	60	1	8500	3000	
Idle @ A	-	-	5	1/12	-	2000	
Total							

e. First fill in Idle @ A, Idle @ B, and 2nd Idle @ A since they will all come from Table 2-2. In each case the idle is at 2000 ft and a temperature of 15°C. Consulting the ground idle fuel shown in Table 2-2, the value of 374 lbs/hr is at the intersection of 2000 ft and 15°C.

$$1st \text{ Idle @ A} = 1/6 \times 374 = 62 \text{ lbs}$$

$$\text{Idle @ B} = 1/4 \times 374 = 94 \text{ lbs}$$

$$2nd \text{ Idle @ A} = 1/12 \times 374 = 31 \text{ lbs}$$



TABLE 2-2

GROUND IDLE FUEL FLOW  
 AIRCRAFT - AH-1C  
 (COBRA)  
 (WITH 540 BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
-25 C	389	371	353	336	318	300
-5 C	391	373	355	337	319	301
15 C	391	374	356	338	321	303
35 C	392	375	358	341	324	307

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HR

TABLE 2-3

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 4000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 54J BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	556	612	552	492	471	485	532	609	746	938
7,500	583	644	576	507	483	493	540	619	760	954
8,000	609	680	602	525	496	504	550	632	775	979
8,500	638	717	630	544	512	518	564	649	793	1017
9,000	668	755	660	565	531	536	580	668	814	1066
9,500	699	794	692	590	551	555	599	691	841	1132
10,000	732	834	726	618	574	577	623	718	877	1220

TABLE 2-4

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	570	626	571	515	497	515	566	647	791	997
7,500	597	656	593	529	507	521	572	655	803	1009
8,000	623	689	616	544	518	529	580	665	816	1025
8,500	650	724	642	561	531	540	590	678	831	1047
9,000	678	761	670	579	546	553	602	693	848	1082
9,500	707	798	699	600	564	570	618	712	868	1130
10,000	738	837	730	623	584	589	636	733	893	1186

Notice the conversion from minutes to hours. These values must be used because fuel flow is in lbs/hr.

f. The fuel flow for leg A-B of the mission is calculated next. This leg takes place at an altitude of 4,000 ft. and a temperature of 15°C. Thus the necessary information is contained in Table 2-3. Leg A-B is at 70 kts and 9,500 lbs. This is not one of the values given but 60 kts is 551 lb/hr and 80 kts is 555 lb/hr. Interpolation gives the value of 553 lb/hr for a 70 kts airspeed. Since the leg is a half hour long:

$$\text{Leg A-B} = 1/2 \times 553 = 277 \text{ lbs}$$

g. Leg B-C is calculated next. Since this takes place at a 3,000 ft. altitude, it is necessary to interpolate between Table 2-3 (4,000 ft) and Table 2-4 (2,000 ft). From Table 2-3 the value for 4,000 ft, 15°C, 40 kts and 9,500 lbs is 590 lb/hr. From Table 2-4 the value for 2,000 ft, 15°C, 40 kts and 9,500 lbs is 600 lb/hr. Interpolation gives the value of 595 lb/hr for a 3,000 ft altitude. Since the leg is one hour long:

$$\text{Leg B-C} = 1 \times 595 = 595 \text{ lbs}$$

h. HIGE at C is calculated next. Since this occurs at 2,000 ft and 15°C the necessary value is found in Table 2-4. At 9,500 lbs, HIGE uses 707 lb/hr of fuel. Since the hover is one-third of an hour long:

$$\text{HIGE @ C} = 1/3 \times 707 = 236 \text{ lbs}$$

i. Leg C-A is the last calculation. Since it takes place at a 3,000 ft altitude, it is once again necessary to interpolate between values from Table 2-3 and Table 2-4. Table 2-3 gives a rate of 512 lb/hr for 4,000 ft, 15°C, 8,500 lbs and 60 kts. Table 2-4 gives a rate of 531 lb/hr for 2,000 ft, 15°C, 8,500 lbs and 60 kts. By interpolation, 522 lb/hr is the value needed. Since the leg is one hour long:

$$\text{Leg C-A} = 1 \times 522 = 522 \text{ lbs}$$

j. The flight profile can be finished by filling in Table 2-1 as shown in Table 2-5.

TABLE 2-5

Helicopter: AH-1S

Temperature: 15°C

LEG	DISTANCE N.M.	AS KTS	TIME		GW LBS	ALT FT	FUEL LBS
			MIN	HR			
Idle @ A	-	-	10	1/6	-	2000	62
A - B	35	70	30	1/2	9500	4000	277
Idle @ B	-	-	15	1/4	-	2000	94
B - C	40	40	60	1	9500	3000	595
HIGE @ C	-	-	20	1/3	9500	2000	236
C - A	60	60	60	1	8500	3000	522
Idle @ A	-	-	5	1/12	-	2000	31
Total							1817

k. Although only three look-up tables were used for this example, each type of table has several conditions that are changed so that a wide band of performance parameters can be addressed. The discussion on each of the five types of tables is contained in Chapter 3. A succinct description of each of these five types of tables is:

(1) Basic Fuel Flow Data: Gives the rate the aircraft uses fuel dependent on the given flight conditions.

(2) Delta Fuel Flow for Drag Data: Gives the additional rate of fuel flow to be added to the basic rate for external drag.

(3) Ground Idle Fuel Flow Data: Gives the rate fuel is used when the aircraft is on the ground with its engine running.

(4) Gross Weight Limits Data: A check on whether or not the aircraft has enough lift to take off with a given weight.

(5) Velocity Limits Data: Gives the optimum (long range) speed and maximum rates of speed.

## CHAPTER 3

### PERFORMANCE DATA TABLE DESCRIPTIONS

#### 1. GENERAL

This chapter describes each of the five basic type tables used for developing flight profiles. The variables within each type of table are described as well as how the specific data required can be extracted.

#### 2. BASIC FUEL FLOW DATA

a. The basic rate of fuel flow\* is determined by five variables:

- (1) Type of aircraft
- (2) Altitude (Air Pressure)\*\*
- (3) Temperature\*\*\*
- (4) Gross Weight\*\*\*\*
- (5) Flight Mode

b. In each table (see Table 3-1) within the basic type, the first three variables are held constant for the whole table, i.e., (a) Type of Aircraft, (b) Altitude (Air Pressure) above sea level, and (c) Temperature. These variables are stated at the top of each table.

c. There are seven rows of fixed gross weights: 7,000 lbs to 10,000 lbs inclusive at 500 lb increments. The ten columns are fixed flight modes.

(1) The first column is Hover In Ground Effect (HIGE). HIGE is used for hovers at a height of 2 feet or less and a component of forward flight 10 kts or less.

(2) The second column is Hover Out of Ground Effect (HOGE). This is used for hovers at a height of more than 2 feet.

---

*\*The basic fuel flow data represents a clean drag configuration with all doors closed, no wing stores, and no external sling loads.*

*\*\*All altitudes or air pressures are feet above sea level.*

*\*\*\*For simplicity, all temperatures are considered to be the average temperature in which the helicopter is operating (Degrees Centigrade).*

*\*\*\*\*Total vehicle weight in pounds.*

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(3) The third column is Nap of the Earth (NOE). This is defined as all flight for variable speeds from 0 to 40 kts and variable altitudes.

(4) The remaining seven columns are for given airspeeds\* (in kts) as the flight mode.

d. There are 24 of these basic fuel flow charts. Each chart is for a different combination of Air Pressure (Altitude) and temperature.

e. The Basic Fuel Flow Data is the main table used in simulating a flight profile. For example, assume a pilot's flight path will require 30 minutes of flight at 80 kts airspeed, 4000 ft. altitude, 15°C and a gross weight of 8,000 lbs in a AH-1S helicopter. Using Table 3-1 at a gross weight of 8,000 lbs and an airspeed of 80 kts, the helicopter will use 504 lbs/hr fuel, i.e., for 30 minutes, 252 lbs of fuel will be used.

f. The gross weight values selected provide the basic range of load carrying capability for the ten flight modes of the AH-1S helicopter. Within the gross weight band shown, linear interpolation\*\* is quite accurate for estimating the fuel flow rates.

g. For example, using Table 3-1, if the helicopter's gross weight was 7,750 lbs and if the flight mode was 60 kts, the fuel flow cannot be found directly. But by interpolating between 60 kts, 7,500 lbs - 483 lbs/hr and 8,000 lbs - 496 lbs/hr, the basic fuel flow rate for 7,750 lbs is 490 lbs/hr. In this example, if the helicopter flies in this mode for 30 minutes, 245 lbs of fuel will be used.

h. As altitude and/or temperature changes occur, different tables are used to look up the aircraft's basic fuel flow rate for each leg of the flight path. Care must be taken that the proper table is used.

i. Appendix A contains a set of functions that will give a good approximation of the basic rate of fuel flow.

### 3. DELTA FUEL FLOW FOR DRAG DATA

a. The delta fuel flow for drag is also determined by five variables:

- (1) Type of Aircraft
- (2) Altitude (Air Pressure)
- (3) Temperature
- (4) Drag Surface (Equivalent Square Footage)
- (5) Air Speed

---

\*All references to airspeeds are to true airspeeds.

\*\*All references to interpolation are linear interpolations. See FPPH, Volume I, Chapter 3 for a discussion on the accuracy of interpolation.

TABLE 3-1

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 4000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	556	612	552	492	471	485	532	609	746	938
7,500	583	644	576	507	483	493	540	619	700	954
8,000	609	680	602	525	496	504	550	632	715	979
8,500	638	717	630	544	512	518	564	649	793	1017
9,000	668	755	660	565	531	536	580	668	814	1066
9,500	699	794	692	590	551	555	599	691	841	1132
10,000	732	834	726	618	574	577	623	718	877	1220



TABLE 3-2

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 4000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUAKE FEET	5.0	1	4	10	19	33	55	94
	10.0	2	8	20	39	67	110	185

b. Like the basic fuel flow tables, there are 24 tables for delta fuel flow for drag.

c. There are two fixed rows of equivalent square feet of drag: 5.0 equivalent sq ft and 10.0 equivalent sq ft.

d. The seven columns are for airspeeds in kts of: 40 kts, 60 kts, 80 kts, 100 kts, 120 kts, 140 kts, and 160 kts.

e. When an external load is placed on the helicopter, the amount of fuel consumed per hour increases. The delta fuel flow for drag tables indicate how much extra fuel consumption to add to the basic fuel flow rate.

f. In the example given earlier, a 30 minute flight at 80 kts airspeed, 4000 ft altitude, 15°C and a gross weight of 8,000 lbs was used. Using the basic fuel flow tables, the basic fuel flow rate was 504 lbs/hr. Assuming for this new example that part of the load is external and inducing a 5.0 equivalent sq ft external drag, the delta fuel flow for drag (Table 3-2) shows 10 lbs/hr should be added to the basic fuel flow rate. Thus the basic fuel flow rate becomes 504 + 10 or 514 lbs per hour and for a half-hour flight, 257 lbs of fuel will be used instead of the 252 lbs figured without an external load.

g. Appendix B contains a function that will give a good approximation of the delta fuel flow for drag.

#### 4. GROUND IDLE FUEL FLOW DATA

a. The ground idle fuel flow rate is determined by only three variables:

- (1) Type of Aircraft
- (2) Altitude (Air Pressure)
- (3) Temperature

b. There is only one ground idle fuel flow table (shown as Table 2-2). The table has four rows of temperatures: -25°C, -5°C, 15°C and 35°C, and six columns of altitudes: Sea Level, 2000 ft, 4000 ft., 6000 ft., 8000 ft., and 10000 ft.

c. The ground idle fuel flow table is used as discussed in the example flight profile in Chapter 2 (Table 2-2). The AH-1S helicopter idling for 20 minutes at 2000 ft. altitude and 15°C, (across the row labeled 15°C and down the column labeled 2000) find the intersection at 374. Thus, the AH-1S uses 374 lbs/hr at these conditions and since it is idling for 20 minutes or 1/3 of an hour, it will use 125 lbs of fuel.

d. If the helicopter had only been 1000 ft. above sea level, the consumption rate would be found by interpolating between the sea level rate of 391 lbs/hr and the 2000 ft. rate of 374 lbs/hr which would be 383 lbs/hr. In 1/3 of an hour 128 lbs of fuel would be used.

e. Appendix C contains a function that will give a good approximation of the ground idle fuel flow.

## 5. GROSS WEIGHT LIMITS DATA

a. Gross weight limits tables are intended to show whether or not the aircraft can safely take off for four sets of criteria. These criteria are defined in the following paragraphs:

(1) Criteria #1 is based on the helicopter using 100% of Maximum Power for take off and having enough power to lift straight up and above ground effect (See Figure 3-1). Once it is in hovering above ground effect level the helicopter begins forward flight until it acquires, transitional lift and is able to climb at 450 ft/min (a desired standard rate of climb) to the desired altitude. This criteria has some risk since the pilot has no reserve power. It has less risk than Criteria #3 but more than Criteria #2 thus it is considered to be "Middle of the Road" risk.

(2) Criteria #2 (Figure 3-1) is based on the helicopter using 95% of Maximum Power for take off and enough power to immediately begin to climb at a rate of 450 ft/min. This is the least risky criteria since the pilot has power in reserve and is still able to climb at a satisfactory rate.

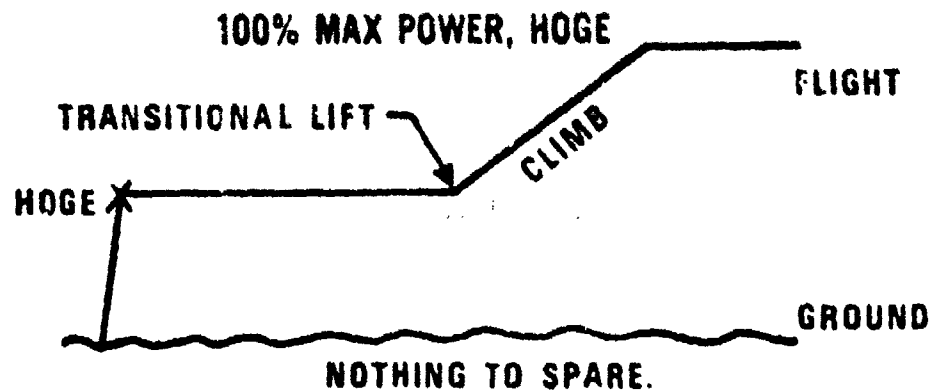
(3) Criteria #3 (Figure 3-1) has the most risk. Using 100% of Maximum Power the helicopter will only hover in ground effect. Therefore, at an altitude of 2 feet or less, the pilot must begin forward flight and gradually increase airspeed to acquire transitional lift to climb. The reasons for its high risk are readily apparent. First, there is no power in reserve. Second, the pilot must begin forward flight at a very low altitude.

(4) Criteria #4. Structural Gross Weight Limits is the total upper limit of gross weight the helicopter can carry under any take off criteria.

b. Gross Weight Limits are determined by four variables:

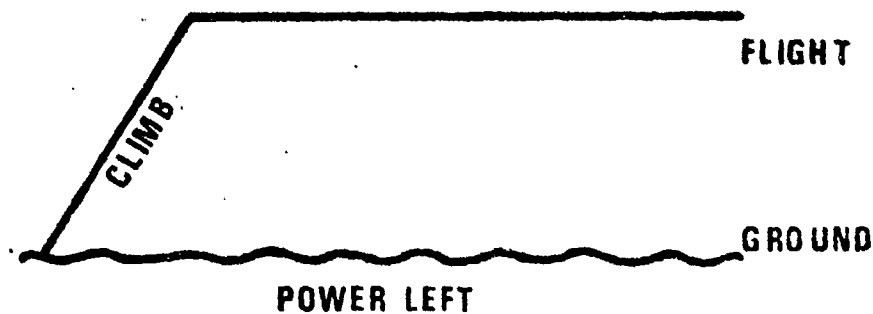
- (1) Type of Aircraft
- (2) Criteria Chosen
- (3) Altitude (Air Pressure)
- (4) Temperature

**CRITERIA #1  
(MIDDLE OF THE ROAD)**



**CRITERIA #2  
(LEAST RISKY)**

95% OF RATED POWER. VERTICAL RATE OF CLIMB 450 FT/MIN. HOGE



**CRITERIA #3  
(MOST RISKY)**

100% MAX POWER, HIGE

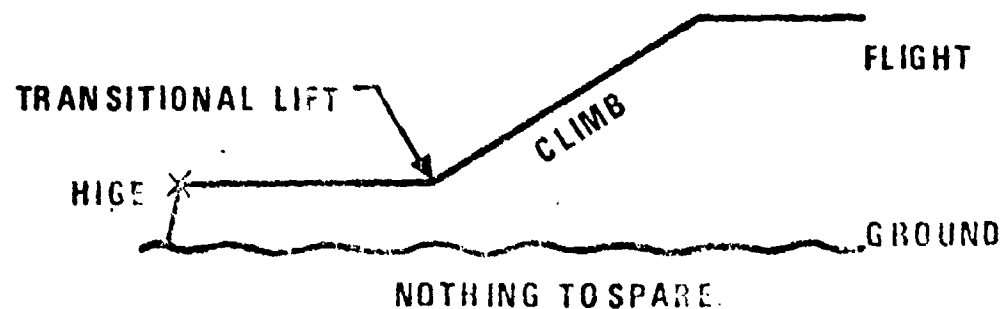


Figure 3-1

c. Additionally, Criteria #1, #2, and #3 differ due to engine power limits or transmission power limits of the aircraft. Thus there are six tables:

- (1) Criteria #1 (Due to engine)
- (2) Criteria #1 (Due to transmission)
- (3) Criteria #2 (Due to engine)
- (4) Criteria #2 (Due to transmission)
- (5) Criteria #3 (Due to engine)
- (6) Criteria #3 (Due to transmission)

d. The structural gross weight limit is a single value for each helicopter and is only dependent on the type helicopter. The AH-1S structural gross weight limit is given as 10,000 lbs and is listed at the bottom of each table. As the name implies, it is simply not safe to expect the AH-1S structure to maneuver normally when the total weight is larger than that value.

e. In simulating inflight profile, the gross weight limits tables are used to check whether the aircraft is going to be too heavy to take off under the given conditions. As an example, assume an AH-1S pilot planned a mission that called for using take off criteria #1 and the take off was to be at 6000 ft., 15°C, and a gross weight of 9,500. Three checks would be required: First, does this gross weight exceed the structural gross weight limit? Second, does it exceed Criteria #1 (due to transmission)? Third, does it exceed Criteria #1 (due to engine)? In the example given, the answer to all three questions is "No", the take off will not exceed aircraft limits. (Tables 3-3 and 3-4)

f. If the assigned gross weight had been 9,700 lbs, it would have exceeded the value given for 6,000 ft. and 15°C at Criteria #1 (Due to transmission). (Table 3-4) The mission could not be flown as planned. The plan could be changed, for example to take off at 4000 ft. (which might not be practical) or change to take off Criteria #3 (which is more risky but has higher limits).

g. If the assigned gross weight had been 10,300 lbs., it would have exceeded the structural limits. To perform the mission the only choices would be to lighten the load or get another type helicopter.

h. Appendix D contains a set of functions that will give a good approximation of the gross weight limits for takeoff.

TABLE 3-3  
GROSS WEIGHT LIMITS  
(DUE TO ENGINE)  
FOR TAKEOFF CRITERIA #1  
100% OF MAXIMUM POWER (MUGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH 54G BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
-25 C	14943	13859	12946	12036	11170	10326
-5 C	13692	12787	11905	11065	10226	9449
15 C	12309	11501	10619	10073	9022	8256
35 C	10623	9781	9005	8212	7483	6805

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 3-4

GROSS WEIGHT LIMITS  
(DUE TO TRANSMISSION)  
FOR TAKEOFF CRITERIA #1  
100% OF MAXIMUM POWER (HUGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
-25 C	10791	10581	10370	10155	9929	9678
-5 C	10568	10361	10150	9928	9681	9398
15 C	10364	10156	9938	9696	9420	9119
35 C	10173	9958	9723	9454	9159	8862

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

## 6. VELOCITY LIMITS DATA

a. There are various types of data given in these tables but like the gross weight limits tables, they are primarily restraints on what can be expected of a helicopter in planning a mission profile. Velocity limits tables are influenced by five variables:

- (1) Type of aircraft
- (2) Air pressure (altitude)
- (3) Temperature
- (4) Gross weight
- (5) Condition or limit

b. Items (1) through (4) are self-explanatory. There are five types of information that can be listed under (5):

- (1) Long range
- (2) Maximum continuous power
- (3) Maximum power (due to engine limits)
- (4) Transmission limits
- (5)  $V_{ne}$  (velocity never exceed)

c. For each aircraft, there are 24 Velocity Limits Tables depending on air pressure and temperature combination. Table 3-5 is an example of the content of the Velocity Limits Table.

d. The two columns under Long Range (Table 3-5) give the optimum speed and fuel flow for each set of variables #1 through #4 above. Thus the AH-1S helicopter operating at 2000 ft., temperature 15°C, and having a gross weight of 8,000 lbs will fly a longer distance if the velocity is kept at 126 kts and will use 707 lbs/hr of fuel at that velocity.

e. Maximum continuous power gives the fastest speed at which a helicopter can fly for long periods (30 minutes or more) and the associated fuel flow rate. An example from Table 3-5 would be an AH-1S helicopter at 2000 ft. and 15°C weighing 8,000 lbs could fly 142 kts with a fuel usage of 837 lbs/hr.



TABLE 3-5

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	128	699	145	837	157	966	146	849	197	1434
7,500	127	701	144	837	156	966	145	849	194	1401
8,000	126	707	142	837	155	966	143	849	190	1377
8,500	126	720	141	837	153	966	142	849	187	1370
9,000	126	736	139	837	151	966	140	849	185	1390
9,500	127	759	137	837	149	966	138	849	180	1423
10,000	127	784	134	837	147	966	135	849	176	1468

f. Maximum power (engine and transmission limits) show the maximum speeds the aircraft can structurally attain for short periods of time (less than 30 minutes). Thus the AH-1S helicopter at 2000 ft and 15°C weighing 8,000 lbs has an engine that is capable of producing enough power to fly 155 kts but the transmission limits the aircraft to 143 kts. Between these two columns then, the flight cannot exceed 143 kts with a fuel flow rate of 849 lbs/hr.

g. There is another limiting factor called Vne (velocity never exceed). This velocity limit is determined by helicopter structural considerations. Vne's for the AH-1S are used as limits. That is, the structure limits the aircraft to that maximum velocity.

#### 7. DETAILED FLIGHT PROFILE USING ALL PERFORMANCE DATA TABLES

The example of a Flight Profile in Chapter 2 was intentionally simplified to assure clarity. The description of the various tables in this handbook, however, indicates a more complex set of considerations are normally encountered in developing the flight profile. With the description provided in this chapter, additional information should be included in the flight plan beyond that shown in the example and a suggested format is provided below in Table 3-6.

TABLE 3-6

Helicopter:  
Altitude:  
Temperature:

LEG	DISTANCE	AS	CHECK VELOCITY LIMIT	TIME	GW (LBS)	DRAG	FUEL

Needed for each take off:  
Weight at take off:  
Type of take off:  
Check transmission limits:  
Check engine limits:  
Check structural gross weight limit:

## CHAPTER 4

### COBRA (AH-1S) PERFORMANCE DATA TABLES

(540 BLADES)

#### GENERAL

The following tables are the major information presented in this handbook. If the procedure for using them is understood, a flight profile for the COBRA (AH-1S) helicopter can be prepared in a matter of a few hours. The performance data contained have been reviewed for accuracy and are corrected to the best of our knowledge. The tables are organized in the following manner:

Tables 4-1 to 4-24	Basic Fuel Flow Data
Tables 4-25 to 4-48	Delta Fuel Flow for Drag Data
Table 4-49	Ground Idle Fuel Flow Data
Tables 4-50 to 4-55	Gross Weight Limits Data
Tables 4-56 to 4-79	Velocity Limits Data

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BASIC FUEL FLOW DATA

TABLES

(540 BLADES)

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TABLE 4-1

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - AH-1S (CUBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	550	615	572	529	522	559	633	746	948	1291
7,500	575	640	590	541	531	566	639	754	962	1314
8,000	601	666	610	553	539	573	645	763	978	1336
8,500	626	694	630	566	549	580	652	772	996	1359
9,000	651	724	652	580	559	587	660	783	1015	1383
9,500	677	757	676	595	570	595	668	794	1037	1410
10,000	705	792	701	610	582	605	678	808	1062	1442

TABLE 4-2

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	568	630	582	534	523	551	614	710	881	1148
7,500	594	656	601	546	531	557	620	716	891	1164
8,000	620	683	621	559	540	563	626	724	902	1181
8,500	646	713	643	573	549	570	633	733	914	1193
9,000	672	746	667	588	560	578	641	744	928	1213
9,500	698	781	692	604	573	588	650	757	943	1239
10,000	726	817	719	621	587	600	662	772	962	1271

TABLE 4-3

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	585	644	593	541	526	548	602	689	841	1062
7,500	611	672	613	554	534	553	608	696	850	1072
8,000	638	702	634	567	544	560	614	704	862	1085
8,500	665	734	658	582	554	567	622	713	875	1098
9,000	691	768	683	598	567	577	631	725	889	1119
9,500	719	805	710	616	582	590	643	739	905	1150
10,000	748	842	739	636	599	606	657	757	924	1193

TABLE 4-4

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - AH-1S (CUBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KIS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	602	659	604	549	531	547	593	609	798	984
7,500	628	689	626	562	540	552	598	675	807	991
8,000	656	721	649	577	550	560	605	683	817	1001
8,500	683	754	674	593	563	569	613	694	829	1016
9,000	711	790	700	611	577	581	625	707	843	1039
9,500	739	827	729	631	594	597	639	722	860	1074
10,000	768	866	760	655	613	614	656	740	882	1123



TABLE 4-5

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 2000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	536	596	550	503	494	526	595	702	896	1222
7,500	562	622	569	516	503	533	601	711	911	1245
8,000	587	651	590	529	512	541	608	720	929	1268
8,500	612	682	613	543	522	548	616	731	950	1293
9,000	639	716	637	558	534	557	624	743	972	1321
9,500	667	751	662	574	547	567	634	758	998	1355
10,000	696	786	689	591	561	579	647	777	1026	1396

TABLE 4-6

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT      TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHT (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	554	611	560	509	494	518	577	667	829	1083
7,500	579	639	580	521	503	524	583	674	840	1100
8,000	605	669	602	535	513	531	590	684	852	1113
8,500	632	703	627	551	524	540	598	695	866	1134
9,000	659	738	653	567	537	550	608	708	883	1162
9,500	687	775	680	585	552	564	620	725	903	1194
10,000	717	812	708	605	570	580	635	744	927	1244

TABLE 4-7

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT      TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	570	626	571	515	497	515	566	647	791	997
7,500	597	656	593	529	507	521	572	655	803	1009
8,000	623	689	616	544	518	529	580	665	816	1025
8,500	650	724	642	561	531	540	590	678	831	1,047
9,000	678	761	670	579	548	553	602	693	848	1082
9,500	707	798	699	600	564	570	618	712	868	1120
10,000	738	837	730	623	584	589	636	733	893	1186

TABLE 4-8

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 2000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1G (CUBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	586	643	583	523	503	514	556	628	751	922
7,500	613	674	606	538	513	521	563	637	761	932
8,000	640	708	631	555	526	531	572	647	774	948
8,500	668	744	659	573	541	544	584	661	788	974
9,000	697	782	688	594	558	560	599	677	807	1013
9,500	727	821	720	619	578	579	617	697	830	1069
10,000	759	862	754	647	601	600	639	719	860	1147

TABLE 4-9

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 4000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	523	580	530	480	467	496	559	661	848	1158
7,500	549	609	551	493	477	503	566	670	866	1181
8,000	574	640	574	507	487	511	573	681	887	1206
8,500	601	674	599	523	499	520	582	694	910	1236
9,000	629	710	624	539	513	531	593	711	936	1272
9,500	659	746	651	557	528	544	607	731	966	1317
10,000	689	783	680	576	545	560	623	754	995	1372

TABLE 4-10

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 4000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	540	595	540	485	468	488	542	627	761	1025
7,500	566	626	563	499	478	495	549	636	793	1036
8,000	592	660	587	515	489	503	558	648	808	1059
8,500	620	696	614	532	503	515	568	662	825	1088
9,000	649	733	641	550	519	529	581	680	847	1126
9,500	679	770	670	571	537	546	597	700	873	1179
10,000	711	808	701	594	557	565	615	724	906	1245

TABLE 4-11

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT      TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 54J BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	556	612	552	492	471	485	532	609	746	938
7,500	583	644	576	507	483	493	540	619	760	954
8,000	609	680	602	525	496	504	550	632	775	979
8,500	638	717	630	544	512	518	564	649	793	1017
9,000	668	755	660	565	531	536	580	668	814	1066
9,500	699	794	692	590	551	555	599	691	841	1132
10,000	732	834	726	618	574	577	623	719	877	1220

TABLE 4-12

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	50	80	100	120	140	160
7,000	571	629	565	501	477	485	524	592	708	866
7,500	599	663	590	517	490	495	533	603	720	884
8,000	626	699	618	537	506	509	545	617	736	912
8,500	655	737	648	559	524	525	561	634	755	955
9,000	686	777	680	584	545	545	581	654	780	1017
9,500	719	818	716	614	568	567	604	680	815	1106
10,000	753	864	757	651	596	593	634	717	858	1255



TABLE 4-13

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 6000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	511	567	513	459	443	467	525	623	805	1098
7,500	537	599	536	473	454	475	533	634	826	1124
8,000	564	634	561	489	466	484	543	647	850	1154
8,500	593	669	587	505	480	496	554	665	877	1193
9,000	623	706	615	524	496	511	569	686	908	1241
9,500	653	743	644	544	514	528	587	711	939	1302
10,000	684	784	676	569	534	547	608	739	978	1378

TABLE 4-14

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT      TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	527	584	524	464	444	460	510	591	737	963
7,500	554	618	549	480	456	469	519	603	752	986
8,000	581	654	576	497	470	481	530	618	770	1018
8,500	611	691	604	516	487	496	543	637	793	1060
9,000	642	729	633	538	506	513	560	658	821	1117
9,500	674	767	665	562	526	533	581	683	857	1190
10,000	706	810	701	592	549	555	607	711	904	1286

TABLE 4-15

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	543	601	536	472	449	458	502	576	706	887
7,500	570	636	563	489	463	470	512	589	722	913
8,000	598	674	591	509	479	485	526	606	740	955
8,500	629	712	622	531	498	503	543	626	763	1007
9,000	661	751	654	557	520	523	564	651	793	1080
9,500	694	793	690	588	544	546	590	681	835	1184
10,000	728	842	735	628	573	574	625	723	902	1354

TABLE 4-16

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	558	618	550	482	456	460	495	560	669	822
7,500	586	654	578	501	472	474	508	575	685	852
8,000	615	693	608	524	491	492	525	593	706	898
8,500	646	733	642	550	512	512	545	614	733	967
9,000	680	775	679	582	537	535	571	643	773	1073
9,500	714	824	724	624	568	565	605	687	839	1253
10,000	750	880	779	678	610	608	656	753	958	1486

TABLE 4-17

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT      TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	500	559	499	440	422	441	495	588	768	1044
7,500	527	593	524	456	434	451	505	603	792	1076
8,000	557	629	551	473	449	463	517	621	820	1116
8,500	587	666	579	492	465	478	533	643	849	1168
9,000	617	704	609	514	484	496	552	669	885	1235
9,500	648	746	643	540	505	517	575	699	927	1318
10,000	681	792	682	571	530	541	603	735	979	1425

TABLE 4-18

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (CUBRA)

(WITH 54U BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	516	576	511	447	424	435	482	560	698	917
7,500	544	612	538	464	438	448	493	576	718	950
8,000	574	650	567	484	456	464	507	595	741	995
8,500	605	687	597	506	475	482	525	617	772	1057
9,000	637	727	630	532	496	502	548	643	811	1137
9,500	669	773	669	565	521	526	577	674	865	1252
10,000	703	826	717	608	552	557	614	719	939	1435

TABLE 4-19

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 8000 FT      TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	531	593	524	455	430	437	476	547	670	850
7,500	560	631	553	475	447	452	490	565	689	893
8,000	591	669	584	498	467	471	508	586	714	949
8,500	623	709	617	525	489	492	531	612	746	1029
9,000	656	753	656	559	514	516	560	646	796	1156
9,500	690	807	706	605	547	549	600	695	853	1357
10,000	726	868	765	662	596	598	657	769	1017	1609

TABLE 4-20

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 6000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (CUBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KIS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	545	610	538	466	439	441	472	534	637	793
7,500	575	649	569	490	458	459	490	553	658	842
8,000	607	689	603	517	480	479	511	575	688	918
8,500	641	733	642	551	507	505	539	608	734	1044
9,000	676	785	691	598	541	539	578	660	816	1248
9,500	712	844	751	658	592	590	639	737	903	1496
10,000	750	911	819	728	660	660	717	844	1103	1773



TABLE 4-21

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KIS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	492	553	486	424	404	419	468	560	736	1000
7,500	521	589	515	441	418	431	481	579	765	1042
8,000	551	626	543	460	436	447	498	602	795	1097
8,500	582	666	575	484	455	466	518	629	833	1169
9,000	613	709	611	512	478	488	543	661	878	1260
9,500	647	758	652	546	504	514	573	702	938	1387
10,000	683	809	699	589	537	547	613	760	1022	1581

TABLE 4-22

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 10000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KIS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	507	571	501	432	408	416	458	535	667	884
7,500	537	608	530	452	425	432	473	555	691	932
8,000	568	647	561	475	445	451	492	578	724	997
8,500	600	688	595	503	467	472	516	605	767	1086
9,000	633	736	638	540	494	499	548	640	827	1226
9,500	668	794	691	587	530	535	591	697	921	1441
10,000	706	852	748	645	581	588	650	786	1007	1704

TABLE 4-23

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	521	589	516	443	416	421	456	525	641	833
7,500	553	627	547	466	436	440	474	547	666	892
8,000	585	667	581	494	459	461	498	574	702	980
8,500	619	714	623	532	486	488	530	612	761	1130
9,000	653	771	677	582	524	526	576	671	865	1356
9,500	690	835	739	644	581	585	642	761	1028	1622
10,000	732	899	808	717	652	658	728	881	1246	1916

TABLE 4-24  
 BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 10000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HQGE	NOE	40	60	80	100	120	140	160
7,000	536	695	531	456	427	427	455	514	612	787
7,500	568	646	565	485	449	448	478	538	644	870
8,000	602	692	606	521	477	475	508	574	696	1014
8,500	637	746	659	572	516	514	553	634	799	1236
9,000	674	808	722	637	574	573	622	722	908	1496
9,500	715	878	794	711	648	650	708	845	1191	1783
10,000	761	959	879	799	734	740	816	986	1454	2091

DELTA FUEL FLOW FOR DRAG DATA  
TABLES  
(540 BLADES)

TABLE 4-25

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	2	6	13	25	47	81	122
	10.0	3	11	27	51	94	166	243

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TABLE 4-26

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

DRAG IN SQUARE FEET		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
5.0		2	5	12	24	43	68	111	
10.0		3	10	25	47	86	140	223	

TABLE 4-27

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 54V BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	5	11	23	38	64	107
	10.0	3	9	22	45	77	127	211



TABLE 4-28

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	10	21	36	60	91
	10.0	3	9	21	42	71	120	190

TABLE 4-29

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 2000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS					
	40	60	80	100	120	140
5.0	2	5	12	24	44	76
10.0	3	10	25	47	87	156
						226

TABLE 4-30

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG.

PRESSURE: 2000 FT      TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	5	11	22	40	64	102
	10.0	3	9	23	44	81	131	207

TABLE 4-31

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 2000 FT      TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	10	21	35	59	100
	10.0	3	9	21	42	72	118	197

TABLE 4-32

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 2000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

DRAG IN FEET	AIR SPEED IN KTS							
	40	60	80	100	120	140	160	
5.0	1	4	10	20	33	56	85	
10.0	2	8	19	39	66	112	177	

TABLE 4-33

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 4000 FT      TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS							
	40	60	80	100	120	140	160	
5.0	1	5	12	22	41	72	105	
10.0	3	10	23	44	81	142	210	

TABLE 4-34

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 4000 FT TEMPERATURE: -5 C  
 AIRCRAFT - An-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	11	20	37	59	94
	10.0	3	9	21	41	75	123	191

TABLE 4-35

CORRECTION FUEL FLOW LBS/HK FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS									
	40	60	80	100	120	140	160			
	1	4	10	19	33	55	94			
5.0										
10.0	2	8	20	39	67	110	185			



TAELE 4-36

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 4000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (CCBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
DRAG IN SQUARE FEET	5.0	1	4	9	18	30	52	80	
	10.0	2	8	16	36	61	104	166	

TABLE 4-37

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	5	11	20	38	67	97
	10.0	3	9	21	42	75	132	195

TABLE 4-38

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (CORRA)

(WITH 540 BLADES)

DRAG I <sup>2</sup> SQUARE FEET	AIR SPEED IN KIS							
	40	60	80	100	120	140	160	180
5.0	1	4	10	19	35	56	90	
10.0	2	8	20	38	70	116	180	

TABLE 4-39

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 6000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

AIR SPEED IN KTS							
DRAG IN SQUARE FEET	40	60	80	100	120	140	160
	1	4	9	18	31	51	88
	2	8	18	36	63	102	169
	5.0						
10.0							

TABLE 4-40

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-15 (COBRA)

(WITH 540 BLADES)

DRAG IN SQUARE FEET		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
5.0	1		4	8	17	28	48	76	
10.0	2		7	17	34	57	95	157	

TABLE 4-41

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 8000 FT      TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
DRAG IN SQUARE FEET	5.0	1	4	10	19	35	63	90	
	10.0	2	8	20	39	69	122	181	

TABLE 4-42

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 8000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	17	32	53	84
	10.0	2	8	18	35	65	109	167

TABLE 4-43

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 8000 FT      TEMPERATURE: 15 C  
 AIRCRAFT - AH-15 (COBRA)  
 (WITH 540 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	16	29	47	78
	10.0	2	7	17	33	60	96	156



TABLE 4-44

CORRECT FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESS. : 8000 FT TEMPERATURE: 35 C  
 AIRCRAFT - An-15 (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
DRAG IN SQUARE FEET	5.0	1	3	8	16	26	45	73	
	10.0	2	7	16	31	53	80	150	

TABLE 4-45

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 10000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
DRAG IN SQUARE FEET	5.0	1	4	9	16	32	56	84	
	10.0	2	8	18	37	64	112	167	

TABLE 4-46

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 10000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
DRAG IN SQUARE FEET	5.0	1	4	9	16	30	50	77	
	10.0	2	7	17	32	60	104	155	

TABLE 4-47

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 10000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

		AIR SPEED IN KIS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	8	15	28	44	70
	10.0	2	7	16	30	56	90	142

TABLE 4-48

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	7	14	25	41	70
	10.0	2	6	15	28	51	82	136

GROUND IDLE FUEL FLOW DATA  
TABLE  
(540 BLADES)

TABLE 4-49

GROUND IDLE FUEL FLOW

AIRCRAFT - AH-1G

(COBRA)

(WITH 540 BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
-25 C	389	371	353	336	318	300
-5 C	391	373	355	337	319	301
15 C	391	374	356	338	321	303
35 C	392	375	358	341	324	307

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HK

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GROSS WEIGHT LIMITS DATA

TABLES

(540 BLADES)

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TABLE 4-50

GROSS WEIGHT LIMITS  
(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #1

100% OF MAXIMUM POWER (HUGE)

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

	PRESSURE ALTITUDE (FT)				
	SEA LEVEL	2000	4000	6000	8000
-25 C	14943	13859	12946	12036	11170
-5 C	13592	12787	11905	11065	10226
15 C	12309	11501	10619	10073	9449
35 C	10623	9781	9005	8212	7483
					6808

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 4-51

GROSS WEIGHT LIMITS  
(DUE TO TRANSMISSION)  
FOR TAKEOFF CRITERIA #1  
100% OF MAXIMUM POWER (HUGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
	-25 C	10791	10581	10370	10155	9929
	-5 C	10568	10361	10150	9928	9681
	15 C	10364	10156	9938	9696	9420
35 C	10175	9958	9723	9454	9159	8862

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 4-52

GROSS WEIGHT LIMITS  
(DUE TO ENGINE)

## FOR TAKEOFF CRITERIA #2

95% OF RATED POWER. VERTICAL RATE OF CLIMB 450 FT/MIN. OGE

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
	-25 C	13927	12912	12072	11227	10421
	-5 C	12739	11906	11088	10309	9524
	15 C	11393	10652	9828	9052	8337
35 C	9762	8983	8267	7533	6861	6238

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 4-53

GROSS WEIGHT LIMITS  
(DUE TO TRANSMISSION)  
FOR TAKEOFF CRITERIA #2

TRANSMISSION POWER LIMIT. VERTICAL RATE OF CLIMB 450 FT/MIN. 06E  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

		PRESSURE ALTITUDE (FT)				
TEMPERATURE DEGREES CENTIGRADE	SEA LEVEL	2000	4000	6000	8000	10000
	-25 C	10247	10056	9667	9677	9482
	-5 C	10044	9859	9672	9481	9277
	15 C	9861	9677	9489	9289	9085
	35 C	9692	9507	9311	9093	8841

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 4-54

GROSS WEIGHT LIMITS  
(DUE TO ENGINE)  
FOR TAKEOFF CRITERIA #3  
100% OF MAXIMUM POWER (HIGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	17279	16022	14974	13924	12924	11947
	-5 C	15810	14771	13754	12787	11814	10915
	15 C	14176	13249	12229	11617	10383	9497
	35 C	12267	11239	10347	9436	8599	7824

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 4-55

GROSS WEIGHT LIMITS  
(DUE TO TRANSMISSION)  
FOR TAKEOFF CRITERIA #3  
100% OF MAXIMUM POWER (HIGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

TEMPERATURE DEGREES CENTIGRADE	PRESSURE ALTITUDE (FT)					
	SEA LEVEL	2000	4000	6000	8000	10000
-25 C	12401	12164	11921	11673	11416	11144
-5 C	12149	11909	11664	11411	11143	10851
15 C	11912	11670	11421	11157	10872	10563
35 C	11690	11444	11186	10906	10604	10284

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

VELOCITY LIMITS DATA

TABLES

(540 BLADES)

TABLE 4-56

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	121	757	152	1147	156	1222	131	849	176	1593
7,500	121	764	151	1147	155	1222	131	849	173	1564
8,000	121	771	150	1147	154	1222	130	849	170	1531
8,500	121	778	149	1147	153	1222	128	849	167	1496
9,000	120	786	148	1147	152	1222	127	849	164	1466
9,500	120	795	146	1147	151	1222	126	849	161	1428
10,000	119	797	145	1147	149	1222	124	849	158	1394



TABLE 4-57

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	125	747	152	1027	159	1139	138	859	183	1491
7,500	124	751	151	1027	159	1139	137	859	180	1466
8,000	124	758	150	1027	158	1139	136	859	177	1435
8,500	124	766	149	1027	157	1139	135	859	174	1403
9,000	124	776	148	1027	155	1139	133	859	170	1375
9,500	124	789	146	1027	154	1139	132	859	167	1353
10,000	123	800	145	1027	152	1139	130	859	164	1342

TABLE 4-58

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL    TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	129	750	146	899	158	1033	143	870	190	1447
7,500	128	751	145	899	157	1033	142	870	187	1411
8,000	127	754	144	899	156	1033	141	870	185	1377
8,500	126	759	142	899	155	1033	140	870	180	1350
9,000	126	771	141	899	153	1033	138	870	177	1334
9,500	126	785	139	899	152	1033	136	870	175	1334
10,000	126	806	137	899	150	1033	134	870	170	1344

TABLE 4-59

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL    TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	134	755	138	779	153	916	149	880	190	1371
7,500	134	760	137	779	152	916	148	880	190	1334
8,000	133	768	135	779	151	916	147	880	190	1307
8,500	134	780	134	779	150	916	146	880	186	1296
9,000	134	797	132	779	148	916	144	880	180	1302
9,500	135	818	129	779	146	916	142	880	175	1324
10,000	135	840	126	779	144	916	140	880	170	1357

TABLE 4-60

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: -25 C  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	121	711	151	1066	155	1132	134	829	183	1626
7,500	121	718	150	1066	154	1132	133	829	180	1598
8,000	121	725	149	1066	153	1132	132	829	176	1567
8,500	120	733	147	1066	151	1132	131	829	173	1535
9,000	120	742	146	1066	150	1132	129	829	170	1508
9,500	118	741	144	1066	148	1132	127	829	167	1485
10,000	116	747	143	1066	146	1132	125	829	164	1473

TABLE 4-61  
 VELOCITY LIMITS TABLE  
 (INCLUDING FUEL FLOW RATES)  
 PRESSURE: 2000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	124	698	151	953	159	1066	141	839	190	1506
7,500	124	705	150	953	158	1066	140	839	187	1477
8,000	124	714	149	953	157	1066	139	839	185	1448
8,500	124	725	147	953	155	1066	137	839	180	1425
9,000	124	738	146	953	154	1066	136	839	177	1413
9,500	123	750	144	953	152	1066	134	839	175	1412
10,000	123	768	142	953	150	1066	132	839	170	1420

TABLE 4-62

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT    TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	128	699	145	837	157	966	146	849	197	1434
7,500	127	701	144	837	156	966	145	849	194	1401
8,000	126	707	142	837	155	966	143	849	190	1377
8,500	126	720	141	837	153	966	142	849	187	1370
9,000	126	736	139	837	151	966	140	849	185	1390
9,500	127	759	137	837	149	966	138	849	180	1423
10,000	127	784	134	837	147	966	135	849	176	1468

TABLE 4-63

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	134	707	137	728	151	844	153	829	197	1277
7,500	133	715	136	728	150	844	152	859	192	1238
8,000	134	728	134	728	149	844	150	859	187	1218
8,500	134	746	132	728	147	844	148	859	182	1215
9,000	135	768	129	728	144	844	146	859	177	1225
9,500	135	789	126	728	142	844	143	859	174	1240
10,000	134	811	122	728	138	844	140	859	167	1260

TABLE 4-64

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT      TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	121	667	151	992	154	1060	137	811	190	1654
7,500	121	674	149	992	153	1060	136	811	186	1627
8,000	120	682	147	992	151	1060	134	811	183	1600
8,500	120	691	146	992	150	1060	132	811	180	1580
9,000	117	689	144	992	148	1060	130	811	176	1569
9,500	116	699	142	992	146	1060	128	811	173	1568
10,000	115	714	140	992	144	1060	126	811	170	1576



TABLE 4-65

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	124	656	150	886	158	994	144	820	197	1512
7,500	124	664	149	886	157	994	143	820	194	1485
8,000	124	676	147	886	155	994	141	820	190	1469
8,500	124	688	145	886	153	994	139	820	187	1469
9,000	123	702	143	886	151	994	137	820	185	1486
9,500	123	723	141	886	149	994	135	820	180	1519
10,000	124	754	138	886	146	994	132	820	170	1562

TABLE 4-66

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT      TEMPERATURE: 15 C  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	127	651	144	780	156	891	149	829	195	1322
7,500	127	660	142	780	154	891	148	829	190	1286
8,000	126	672	141	780	152	891	146	829	185	1270
8,500	126	690	138	780	150	891	144	829	180	1276
9,000	126	711	136	780	148	891	142	829	175	1291
9,500	128	742	133	780	145	891	139	829	170	1308
10,000	129	780	129	780	141	891	135	829	165	1327

TABLE 4-67

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	133	665	135	671	149	777	157	838	185	1071
7,500	134	679	133	671	148	777	155	838	177	1049
8,000	134	698	130	671	145	777	153	838	172	1042
8,500	135	719	127	671	143	777	150	838	167	1042
9,000	134	741	123	671	140	777	146	838	162	1047
9,500	133	764	118	671	136	777	142	838	157	1042
10,000	132	795	111	671	130	777	137	838	151	1049

TABLE 4-68

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	120	626	148	918	153	986	139	797	197	1677
7,500	120	635	147	918	151	986	138	797	194	1655
8,000	119	638	145	918	150	986	136	797	190	1643
8,500	116	642	143	918	148	986	134	797	187	1646
9,000	115	653	141	918	146	986	132	797	185	1667
9,500	115	670	139	918	143	986	129	797	180	1701
10,000	115	698	136	918	140	986	124	797	176	1745

TABLE 4-69

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT    TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	124	617	148	819	157	924	147	804	195	1394
7,500	124	629	147	819	155	924	145	804	190	1363
8,000	123	641	145	819	153	924	143	804	185	1350
8,500	123	657	142	819	151	924	141	804	180	1351
9,000	123	682	140	819	148	924	138	804	175	1362
9,500	125	715	137	819	145	924	135	804	170	1375
10,000	124	745	135	819	141	924	132	804	165	1400

TABLE 4-70  
 VELOCITY LIMITS TABLE  
 (INCLUDING FUEL FLOW RATES)  
 PRESSURE: 6000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	127	613	142	722	156	850	152	811	181	1101
7,500	126	626	140	722	154	850	151	811	176	1084
8,000	126	645	138	722	152	850	148	811	171	1082
8,500	127	668	135	722	149	850	145	811	165	1084
9,000	128	702	131	722	145	850	142	811	160	1063
9,500	129	741	127	722	141	850	138	811	155	1074
10,000	127	772	120	722	136	850	132	811	150	1076

TABLE 4-71

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	134	631	131	615	146	710	160	819	167	824
7,500	134	650	128	615	144	710	157	819	162	871
8,000	135	672	125	615	141	710	153	819	156	855
8,500	134	604	120	615	137	710	149	819	151	839
9,000	133	719	113	615	132	710	145	819	146	832
9,500	131	755	103	615	124	710	138	819	140	843
10,000	125	793	86	615	113	710	129	819	135	686

TABLE 4-72

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 54C BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	120	589	147	850	151	910	141	786	195	1562
7,500	118	592	145	850	149	910	140	786	190	1553
8,000	116	597	142	850	147	910	137	786	185	1520
8,500	115	610	140	850	145	910	135	786	180	1521
9,000	115	632	138	850	142	910	132	786	175	1531
9,500	115	660	134	850	139	910	129	786	170	1542
10,000	114	691	131	850	136	910	125	786	165	1553



TABLE 4-73

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -5 C  
AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	124	584	146	753	155	853	149	791	180	1154
7,500	123	596	144	753	152	853	147	791	175	1138
8,000	123	614	141	753	150	853	145	791	170	1132
8,500	124	642	138	753	147	853	142	791	165	1138
9,000	125	676	135	753	143	853	138	791	159	1123
9,500	124	703	130	753	139	853	134	791	154	1111
10,000	123	742	124	753	133	853	128	791	149	1110

TABLE 4-74

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-15 (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	126	581	139	660	151	755	155	797	165	907
7,500	127	602	136	660	148	755	152	797	160	893
8,000	127	627	132	660	145	755	149	797	155	870
8,500	129	663	128	660	141	755	145	797	149	851
9,000	129	700	123	660	136	755	140	797	144	844
9,500	125	731	114	660	128	755	133	797	138	859
10,000	122	784	101	660	118	755	123	797	135	910

TABLE 4-75

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: 35 C  
AIRCRAFT - AH-1B (COBRA)  
(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	134	605	125	558	142	648	161	803	151	712
7,500	135	627	121	558	138	648	157	803	145	694
8,000	134	649	115	558	134	648	152	803	139	684
8,500	132	676	107	558	128	648	146	803	134	666
9,000	128	714	91	558	118	648	139	803	128	712
9,500	123	764	0	558	103	648	128	803	123	757
10,000	120	845	0	558	0	648	115	803	117	817

TABLE 76

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	118	548	144	786	149	846	143	777	180	1286
7,500	116	555	142	786	147	846	141	777	175	1270
8,000	115	570	139	786	144	846	138	777	170	1262
8,500	115	594	137	786	141	846	136	777	165	1267
9,000	115	624	133	786	138	846	132	777	159	1246
9,500	114	656	128	786	134	846	127	777	154	1228
10,000	113	698	123	786	128	846	122	777	149	1220

TABLE 4-77

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)  
(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	123	554	144	698	152	788	151	781	164	938
7,500	123	573	141	698	149	788	148	781	159	915
8,000	124	603	137	698	146	788	145	781	155	891
8,500	125	635	133	698	142	788	141	781	148	871
9,000	123	664	128	698	137	788	136	781	145	862
9,500	121	705	125	698	130	788	129	781	137	875
10,000	114	736	109	698	120	788	120	781	132	925

TABLE 4-78

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	127	560	134	600	147	690	156	786	148	705
7,500	127	587	130	600	143	690	152	786	145	688
8,000	129	624	125	600	139	690	148	786	137	678
8,500	128	657	117	600	132	690	142	786	132	683
9,000	123	696	106	600	123	690	134	786	126	713
9,500	118	747	86	600	110	690	123	786	120	763
10,000	115	833	0	600	91	690	109	786	115	830

TABLE 4-79

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-15 (COBRA)

(WITH 540 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	135	583	116	500	136	590	160	790	133	571
7,500	134	605	109	500	131	590	155	790	127	567
8,000	131	636	96	500	123	590	148	790	121	579
8,500	126	672	0	500	111	590	139	790	115	610
9,000	122	742	0	500	89	590	128	790	109	660
9,500	115	805	0	500	0	590	114	790	104	724
10,000	114	928	0	500	0	590	95	790	98	804

CHAPTER 5  
COBRA (AH-1S) PERFORMANCE DATA TABLES  
(747 BLADES)

GENERAL

The following tables are the major information presented in this handbook. If the procedure for using them is understood, a flight profile for the COBRA (AH-1S) helicopter can be prepared in a matter of a few hours. The performance data contained have been reviewed for accuracy and are corrected to the best of our knowledge. The tables are organized in the following manner:

Tables 5-1 to 5-24	Basic Fuel Flow Data
Tables 5-25 to 5-48	Delta Fuel Flow for Drag Data
Table 5-49	Ground Idle Fuel Flow Data
Tables 5-50 to 5-55	Gross Weight Limits Data
Tables 5-56 to 5-79	Velocity Limits Data



BASIC FUEL FLOW DATA

TABLES

(747 BLADES)

TABLE 5-1

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: SEA LEVEL TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	547	607	552	497	478	531	613	733	946	1343
7,500	573	634	574	515	491	542	622	743	958	1371
8,000	600	661	597	533	504	553	631	753	971	1398
8,500	625	689	620	552	519	564	641	764	986	1424
9,000	651	718	645	572	534	576	651	776	1003	1449
9,500	677	749	671	593	550	589	662	789	1022	1471
10,000	705	780	697	613	568	601	673	812	1042	1493

TABLE 5-2

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	567	624	567	511	487	529	597	699	868	1200
7,500	593	651	590	529	500	539	606	707	876	1219
8,000	619	678	613	547	514	550	615	717	884	1237
8,500	645	707	637	561	528	561	625	727	894	1253
9,000	672	737	662	586	544	573	635	739	905	1266
9,500	699	768	689	609	561	585	646	751	917	1280
10,000	727	802	716	631	579	598	658	764	940	1293

TABLE 5-3

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	585	639	582	526	498	531	589	640	626	1110
7,500	611	667	606	544	511	541	598	628	823	1123
8,000	638	695	624	563	526	552	607	698	642	1134
8,500	665	725	654	583	541	563	617	708	652	1143
9,000	692	756	660	604	557	575	628	719	664	1151
9,500	719	789	708	626	575	588	639	732	676	1161
10,000	748	824	737	650	593	601	652	742	690	1179

TABLE 5-4  
BASIC FUEL FLOW  
FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
PRESSURE: SEA LEVEL    TEMPERATURE: 35 C  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	601	655	597	540	510	537	586	669	776	1053
7,500	628	683	621	559	524	547	595	677	804	1062
8,000	656	712	645	578	539	557	604	687	813	1069
8,500	683	743	671	599	555	569	615	697	824	1075
9,000	711	775	698	621	572	581	626	708	835	1083
9,500	739	810	726	645	590	594	639	719	849	1103
10,000	768	846	759	671	609	608	652	731	868	1141

TABLE 5-5

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 2000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	535	591	535	480	457	504	579	691	891	1276
7,500	561	618	558	498	471	515	588	701	905	1303
8,000	586	646	581	517	485	527	598	713	920	1329
8,500	612	675	606	537	501	539	608	725	937	1353
9,000	639	706	632	558	517	551	619	738	957	1375
9,500	667	738	659	574	535	564	631	761	978	1397
10,000	696	771	686	600	553	578	644	778	1001	1420

TABLE 5-6

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 2000 FT      TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NDE	40	60	80	100	120	140	160
7,000	553	607	550	493	466	502	564	658	815	1135
7,500	579	634	573	511	479	512	573	668	823	1152
8,000	605	663	597	531	494	524	583	678	833	1167
8,500	632	693	623	552	510	536	593	690	844	1181
9,000	659	726	649	573	528	548	605	703	865	1194
9,500	688	760	677	595	545	561	617	716	880	1208
10,000	718	794	706	618	564	575	630	729	898	1231

TABLE 5-7

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 2000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	569	622	564	506	476	504	556	640	775	1045
7,500	596	650	588	526	491	515	565	650	784	1056
8,000	623	679	613	546	506	526	576	660	795	1064
8,500	650	711	639	568	523	538	587	671	806	1072
9,000	678	745	668	590	540	551	599	682	819	1084
9,500	706	781	697	614	559	564	612	695	834	1110
10,000	738	817	728	640	579	579	625	708	853	1148



TABLE 5-8

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK

PRESSURE: 2000 FT      TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	HIGE	40	60	80	100	120	140	160
7,000	585	637	579	520	488	509	552	630	746	986
7,500	613	666	603	540	503	520	563	640	757	995
8,000	641	697	629	561	519	531	574	650	766	1001
8,500	669	730	657	584	536	543	585	661	780	1010
9,000	697	765	687	608	554	557	598	672	795	1037
9,500	727	801	718	635	574	571	612	685	816	1076
10,000	759	838	751	663	595	587	627	701	842	1109

TABLE 5-9  
 BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 4000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)										
	HIGE	HIGE	NOE	40	60	80	100	120	140	160	
7,000	523	576	520	464	438	479	546	652	841	1212	
7,500	548	604	543	483	453	491	556	663	857	1236	
8,000	574	634	568	503	468	503	567	676	874	1261	
8,500	601	665	595	524	485	516	578	689	894	1284	
9,000	630	697	621	545	503	529	590	713	916	1306	
9,500	660	731	649	567	522	542	604	730	940	1329	
10,000	690	765	678	588	540	556	619	748	967	1360	

TABLE 5-10

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	540	591	534	476	446	477	533	621	765	1071
7,500	566	620	558	496	461	488	543	631	775	1086
8,000	592	650	584	517	478	500	553	643	787	1100
8,500	620	683	611	539	495	513	565	656	808	1113
9,000	649	718	639	561	513	526	577	669	824	1128
9,500	680	753	666	584	532	540	591	683	843	1159
10,000	711	788	699	610	552	555	605	698	868	1256

TABLE 5-11

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 4000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	556	606	548	490	457	479	526	604	729	981
7,500	583	635	573	510	472	490	536	615	739	990
8,000	610	668	600	532	489	502	547	626	751	999
8,500	638	702	628	555	507	515	560	637	764	1012
9,000	668	738	658	579	526	529	573	650	781	1045
9,500	699	774	690	605	546	544	587	665	802	1081
10,000	732	811	722	633	567	560	603	683	830	1117

TABLE 5-12

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 4000 FT      TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	571	621	562	503	468	483	524	595	704	924
7,500	599	651	588	525	484	495	534	606	715	930
8,000	627	685	616	547	502	507	546	616	727	942
8,500	655	721	647	573	520	521	559	628	744	974
9,000	686	757	678	600	540	536	574	642	766	1010
9,500	719	795	711	627	562	552	590	660	794	1052
10,000	754	833	744	655	584	570	609	682	828	1116

TABLE 5-13

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT      TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	511	563	506	450	421	456	517	616	796	1150
7,500	537	593	531	470	437	469	528	629	814	1174
8,000	564	624	558	491	454	481	539	650	835	1196
8,500	593	657	585	512	472	495	552	666	857	1218
9,000	623	691	613	534	491	508	566	684	882	1243
9,500	653	726	642	559	510	523	581	702	911	1263
10,000	684	763	675	587	530	538	598	722	940	1340

TABLE 5-14

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT      TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	527	577	520	462	429	454	504	587	720	1009
7,500	554	608	546	483	446	466	515	599	732	1022
8,000	582	642	573	505	463	479	527	612	753	1035
8,500	611	676	602	527	482	492	540	625	769	1054
9,000	642	712	631	551	501	507	553	639	791	1092
9,500	673	747	663	579	521	522	568	656	818	1137
10,000	705	785	697	608	542	538	585	676	854	1181

TABLE 5-15

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6000 FT      TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	543	592	534	475	440	456	498	571	687	919
7,500	570	625	561	497	457	468	510	582	699	926
8,000	599	660	590	520	474	481	522	594	712	944
8,500	629	695	620	545	494	495	535	607	730	983
9,000	660	732	652	572	514	511	550	623	754	1015
9,500	694	769	684	600	536	527	567	644	784	1062
10,000	728	808	719	630	558	545	587	668	821	1128



TABLE 5-16

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 6005 PSI TEMPERATURE: 35 C

AIRSPEED - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7000	558	607	548	488	451	460	497	563	664	864
7500	586	641	576	511	468	473	509	573	677	877
8000	615	677	607	537	487	487	522	585	695	913
8500	646	714	639	565	508	502	537	600	719	947
9000	680	752	672	592	529	518	554	620	749	1002
9500	715	791	706	621	553	537	574	644	785	1041
10000	751	832	743	654	578	557	596	672	830	1110

TABLE 5-17

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	500	552	495	438	407	436	490	584	756	1090
7,500	528	584	521	459	424	448	502	605	777	1112
8,000	557	617	549	480	442	462	515	622	800	1134
8,500	587	651	577	503	461	476	529	639	826	1162
9,000	617	687	608	528	480	490	545	658	853	1211
9,500	648	725	641	557	501	506	562	679	889	1266
10,000	680	766	677	588	523	524	582	705	931	1320

TABLE 5-18

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (CORRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIKE	HUGE	MOE	40	60	80	100	120	140	160
7,000	516	567	508	450	415	433	476	556	679	949
7,500	544	601	536	472	432	446	490	569	700	962
8,000	574	635	565	494	451	460	503	583	718	984
8,500	605	671	595	519	471	474	517	597	741	1028
9,000	636	707	627	548	491	490	533	615	771	1069
9,500	669	746	662	578	512	507	552	637	810	1125
10,000	704	789	699	609	536	525	574	669	858	1197

TABLE 5-19

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HK  
 PRESSURE: 8000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)										
	HIGE	HIGE	NOE	40	60	80	100	120	140	160	
7,000	531	582	522	463	425	435	473	541	649	861	
7,500	560	617	552	486	443	448	486	553	663	890	
8,000	590	653	582	512	463	463	500	566	682	918	
8,500	622	690	614	539	483	479	515	583	708	952	
9,000	656	727	648	568	505	495	533	606	740	1011	
9,500	691	769	684	599	528	514	554	632	782	1067	
10,000	727	814	723	632	555	535	579	661	834	1157	

TABLE 5-20  
BASIC FUEL FLOW  
FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
PRESSURE: 6000 FT      TEMPERATURE: 35 C  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	MIGE	HOGC	NOE	40	60	80	100	120	140	160
7,000	546	598	537	476	436	439	473	532	629	815
7,500	575	634	568	503	455	454	486	545	648	853
8,000	607	671	600	530	476	469	501	561	673	887
8,500	641	709	633	558	498	486	520	582	705	948
9,000	677	749	668	586	522	505	540	607	744	983
9,500	713	792	707	622	548	527	563	637	792	1099
10,000	750	841	750	658	577	556	591	672	853	1246

TABLE 5-21

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 10000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	H0GE	H0L	40	60	80	100	120	140	160
7,000	492	544	486	427	395	417	466	562	722	1032
7,500	521	577	513	448	413	430	479	579	745	1055
8,000	551	612	542	472	431	444	494	596	772	1086
8,500	582	648	573	499	451	459	510	616	801	1140
9,000	613	687	608	529	472	476	528	639	840	1193
9,500	646	730	644	559	496	494	549	668	885	1260
10,000	683	776	683	590	521	515	580	703	938	1344

TABLE 5-22

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	507	560	499	439	402	414	455	528	650	892
7,500	537	595	528	462	421	428	469	542	668	918
8,000	566	630	559	488	441	443	483	557	693	963
8,500	600	667	592	517	462	459	499	576	726	1005
9,000	633	708	626	547	484	477	520	600	768	1073
9,500	669	753	666	579	509	497	544	634	817	1134
10,000	708	802	707	613	537	520	569	667	874	1243

TABLE 5-23

BASIC FUEL FLOW  
 FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR  
 PRESSURE: 10000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	522	576	514	453	412	416	452	513	616	819
7,500	552	612	545	479	432	431	465	527	636	857
8,000	585	648	577	506	453	447	481	545	663	893
8,500	619	687	611	536	475	465	500	569	698	958
9,000	655	730	649	568	500	484	523	597	744	1012
9,500	691	778	690	602	528	507	549	628	800	1153
10,000	732	830	735	639	559	540	578	663	865	1297



TABLE 5-24

## BASIC FUEL FLOW

FUEL FLOW RATES FOR THE GIVEN CONDITIONS IN LBS/HR

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	FLIGHT MODE (KTS)									
	HIGE	HIGE	NOE	40	60	80	100	120	140	160
7,000	536	591	530	468	423	422	452	506	602	794
7,500	568	628	562	496	444	437	467	523	628	830
8,000	603	666	595	524	467	455	486	545	662	893
8,500	639	707	631	556	492	475	508	572	704	934
9,000	675	753	672	590	519	498	532	604	756	1086
9,500	715	805	717	629	550	529	562	640	827	1227
10,000	760	865	769	672	588	538	600	683	922	1574

DELTA FUEL FLOW FOR DRAG DATA  
TABLES  
(747 BLADES)

TABLE 5-25  
 CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS							
	40	60	80	100	120	140	160	
5.0	2	5	13	25	47	81	122	
10.0	3	11	27	51	94	166	243	

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TABLE 5-26

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	5	12	24	42	68	113
	10.0	3	10	24	48	86	139	225

TABLE 5-27

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: SEA LEVEL TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (CORRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS						
	40	60	80	100	120	140	160
5.0	1	5	11	23	38	64	110
10.0	3	9	22	45	76	127	211

TABLE 5-28

CORRECTION FUE, FLOW LBS/HR FOR EXTERNAL DRAG  
PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

DRAG IN SQUARE FEET		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
	5.0	1	4	10	21	36	60	97	
	10.0	3	8	20	42	71	120	200	

TABLE 5-29  
 CORRECTION FUE, FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 2000 FT      TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
5.0	2		5	12	23	44	76	113
10.0	3		13	25	47	87	155	226

TABLE 5-30

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	5	11	22	39	63	105
	10.0	3	9	23	44	80	130	209



TABLE 5-31

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 2000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS						
	40	60	80	100	120	140	160
5.0	1	4	10	21	35	60	98
10.0	3	8	21	42	71	118	196

TABLE 5-32

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 2000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-15 (COBRA)  
 (WITH K747 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	10	19	33	56	91
	10.0	2	8	19	39	66	112	187

TABLE 5-33

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	5	12	22	41	71	105
	10.0	3	9	23	44	81	146	210

TABLE 5-34

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	11	21	37	59	97
	10.0	3	9	21	41	75	121	194

TABLE 5-35

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 4000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-15 (COBRA)  
 (WITH K747 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	10	20	33	55	91
	10.0	2	8	20	39	67	110	182

TABLE 5-36  
 CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 4000 FT    TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
DRAG IN SQUARE FEET	5.0	1	4	9	18	30	52	85	
	10.0	2	7	18	36	61	104	174	

TABLE 5-37

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 6000 FT      TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

DRAG IN SQUARE FEET		AIR SPEED IN KTS							
		40	60	80	100	120	140	160	
5.0		1	4	11	20	38	67	97	
10.0		3	9	21	41	75	132	195	

TABLE 5-38

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 6000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-15 (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS						
	40	60	80	100	120	140	160
5.0	1	4	10	19	35	55	90
10.0	2	8	20	38	70	114	180



TABLE 5-39

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 6000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	18	31	51	84
	10.0	2	8	18	36	63	102	168

TABLE 5-40  
 CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 6000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS						
	40	60	80	100	120	140	160
	1	4	8	17	28	48	79
5.0							
10.0	2	7	17	34	57	96	158

TABLE 5-41

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT      TEMPERATURE: -25 C

AIRCRAFT - AH-15 (COBRA)

(WITH K747 BLADES)

		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	10	19	35	63	90
	10.0	2	8	20	39	69	122	181

TABLE 5-42

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 8000 FT TEMPERATURE: -5 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	17	32	52	84
	10.0	2	8	18	35	65	107	167

TABLE 5-43

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 8000 FT      TEMPERATURE: 15 C  
 AIRCRAFT - AH-15 (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS						
	40	60	80	100	120	140	160
5.0	1	4	9	17	29	47	78
10.0	2	7	17	33	59	95	155

TABLE 5-44

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 8000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

AIR SPEED IN KTS							
DRAG IN SQUARE FEET	40	60	80	100	120	140	160
	1	3	8	16	26	45	74
	2	7	16	31	53	89	147
5.0							
10.0							

TABLE 5-45

CORRECTION FUE, FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 10000 FT TEMPERATURE: -25 C  
 AIRCRAFT - AH-1S (C08RA)  
 (WITH K747 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	4	9	18	32	59	84
	10.0	2	8	18	37	64	113	167

TABLE 5-46

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1G (COBRA)

(WITH K747 BLADES)

DRAG IN SQUARE FEET		AIR SPEED IN KTS						
		40	60	80	100	120	140	160
5.0	1		4	9	16	30	49	77
10.0	2		7	17	32	60	102	155



TABLE 5-47

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 13000 FT TEMPERATURE: 15 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

DRAG IN SQUARE FEET	AIR SPEED IN KTS							
	40	60	80	100	120	140	160	
5.0	1	3	8	15	27	43	71	
10.0	2	7	16	30	55	88	143	

TABLE 5-48

CORRECTION FUEL FLOW LBS/HR FOR EXTERNAL DRAG  
 PRESSURE: 10000 FT TEMPERATURE: 35 C  
 AIRCRAFT - AH-1S (COBRA)  
 (WITH K747 BLADES)

AIR SPEED IN KTS								
		40	60	80	100	120	140	160
DRAG IN SQUARE FEET	5.0	1	3	7	14	25	41	71
	10.0	2	6	15	28	50	82	136

GROUND IDLE FUEL FLOW DATA

TABLE

(747 BLADES)

TABLE 5-49

GROUND IDLE FUEL FLOW  
 AIRCRAFT - AH-1S  
 (COBRA)  
 (WITH K747 BLADES)

PRESSURE ALTITUDE (FT)							
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	389	371	353	336	318	300
	-5 C	391	373	355	337	319	301
	15 C	391	374	356	338	321	303
	35 C	392	375	358	341	324	307

ENTRIES ARE AIRCRAFT FUEL FLOW RATES IN LBS/HR

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GROSS WEIGHT LIMITS DATA

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(747 BLADES)

TABLE 5-50

GROSS WEIGHT LIMITS  
(DUE TO ENGINE)  
FOR TAKEOFF CRITERIA #1  
100% OF MAXIMUM POWER (H0GE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

PRESSURE ALTITUDE (FT)							
SEA LEVEL		2000	4000	6000	8000	10000	
TEMPERATURE DEGREES CENTIGRADE	-25 C	15602	14464	13525	12579	11677	10793
	-5 C	14276	13343	12428	11555	10674	9859
	15 C	12767	11937	11013	10480	9343	8540
	35 C	10946	10073	9270	8446	7691	6992

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 5-51

GROSS WEIGHT LIMITS  
(DUE TO TRANSMISSION)  
FOR TAKEOFF CRITERIA #1  
100% OF MAXIMUM POWER (HOGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	11034	10837	10637	10439	10234	10017
	-5 C	10828	10633	10439	10238	10024	9797
	15 C	10636	10445	10248	10038	9815	9580
	35 C	10460	10266	10060	9842	9612	9366

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 5-52

GROSS WEIGHT LIMITS

(DUE TO ENGINE)

FOR TAKEOFF CRITERIA #2

95% OF RATED POWER. VERTICAL RATE OF CLIMB 450 FT/MIN. OGE

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	14377	13326	12466	11596	10766	9949
	-5 C	13143	12288	11447	10645	9830	9079
	15 C	11724	10965	10113	9638	8573	7830
	35 C	10008	9207	8470	7714	7022	6382

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS



TABLE 5-53

JSS WEIGHT LIMITS  
(BASE TO TRANSMISSION)

FOR TAKEOFF CRITERIA #2

TRANSMISSION POWER LIMIT. VERTICAL RATE OF CLIMB 450 FT/MIN. CGE

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

		PRESSURE ALTITUDE (FT)					
		SEA LEVEL	2000	4000	6000	8000	10000
TEMPERATURE DEGREES CENTIGRADE	-25 C	10436	10272	10095	9916	9737	9552
	-5 C	10262	10090	9915	9740	9557	9362
	15 C	10093	9920	9748	9569	9378	9174
	35 C	9934	9764	9588	9401	9201	8990

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 5-54

GROSS WEIGHT LIMITS  
(DUE TO ENGINE)  
FOR TAKEOFF CRITERIA #3  
100% OF MAXIMUM POWER (HIGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

		PRESSURE ALTITUDE (FT)						
TEMPERATURE DEGREES CENTIGRADE		SEA LEVEL	2000	4000	6000	8000	10000	
	-25 C	17282	16025	14978	13928	12928	11950	
	-5 C	15810	14772	13756	12789	11816	10916	
	15 C	14163	13239	12218	11614	10371	9484	
	35 C	12187	11222	10334	9428	8596	7825	

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

TABLE 5-55

GROSS WEIGHT LIMITS  
(DUE TO TRANSMISSION)  
FOR TAKEOFF CRITERIA #3  
100% OF MAXIMUM POWER (HIGE)  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

		PRESSURE ALTITUDE (FT)				
		SEA LEVEL	2000	4000	6000	8000
TEMPERATURE DEGREES CENTIGRADE	-25 C	12400	12173	11929	11664	11395
	-5 C	12158	11916	11655	11390	11129
	15 C	11919	11662	11400	11143	10871
	35 C	11683	11424	11170	10904	10609
						10000
						11130
						10051
						10569
						10293

ENTRIES ARE AIRCRAFT GROSS WEIGHTS IN LBS

STRUCTURAL GROSS WEIGHT LIMIT: 10,000 LBS

VELOCITY LIMITS DATA  
TABLES  
(747 BLADES)

TABLE 5-56

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	115	698	152	1147	155	1222	132	849	190	2042
7,500	116	710	151	1147	154	1222	131	849	187	2016
8,000	116	721	150	1147	153	1222	130	849	183	1981
8,500	116	733	149	1147	152	1222	129	849	180	1936
9,000	116	744	148	1147	152	1222	127	849	177	1884
9,500	116	756	147	1147	151	1222	126	849	173	1824
10,000	114	754	146	1147	150	1222	124	849	170	1758

TABLE 5-57

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	122	717	152	1027	158	1139	139	859	193	1821
7,500	123	732	151	1027	157	1139	138	859	187	1792
8,000	124	747	150	1027	156	1139	138	859	183	1730
8,500	125	762	149	1027	155	1139	137	859	180	1681
9,000	125	778	149	1027	154	1139	136	859	177	1624
9,500	126	793	148	1027	154	1139	134	859	173	1563
10,000	128	818	146	1027	153	1139	133	859	170	1500

TABLE 5-58

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: 15 C

AIRCRAFT - AH-1J (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	129	741	147	899	156	1033	144	870	190	1650
7,500	131	758	146	899	156	1033	144	870	187	1613
8,000	132	775	145	899	155	1033	143	870	183	1566
8,500	133	792	145	899	155	1033	142	870	180	1511
9,000	133	806	143	899	154	1033	141	870	177	1450
9,500	134	820	142	899	153	1033	139	870	173	1391
10,000	133	832	141	899	151	1033	138	870	170	1344

TABLE 5-50

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: SEA LEVEL TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	135	758	138	779	151	916	148	880	196	1666
7,500	135	768	137	779	151	916	148	860	193	1622
8,000	135	774	136	779	150	916	147	880	190	1566
8,500	135	783	135	779	149	916	146	880	186	1501
9,000	135	796	133	779	148	916	145	880	183	1433
9,500	135	812	131	779	146	916	143	880	179	1394
10,000	135	826	128	779	145	916	141	880	176	1395



TABLE 5-60

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	116	660	151	1066	154	1132	135	829	190	1957
7,500	116	672	150	1066	153	1132	133	829	187	1925
8,000	116	684	149	1066	152	1132	132	829	183	1887
8,500	116	695	148	1066	151	1132	131	829	180	1841
9,000	116	708	147	1066	150	1132	130	829	177	1786
9,500	113	706	145	1066	149	1132	128	824	173	1725
10,000	113	720	144	1066	148	1132	126	829	170	1662

TABLE 5-61

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	123	682	151	953	157	1066	142	839	190	1737
7,500	124	696	150	953	156	1066	142	839	187	1679
8,000	125	711	149	953	155	1066	141	839	183	1634
8,500	126	728	148	953	155	1066	140	839	180	1581
9,000	126	745	147	953	154	1066	138	839	177	1522
9,500	128	771	146	953	153	1066	137	839	173	1482
10,000	130	798	144	953	151	1066	135	839	170	1417

TABLE 5-62

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 2000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	131	706	146	837	156	966	147	849	197	1677
7,500	132	723	145	837	155	966	147	849	194	1633
8,000	133	740	144	837	155	966	146	849	190	1577
8,500	133	753	143	837	154	966	144	849	187	1512
9,000	134	766	142	837	153	966	143	849	183	1449
9,500	133	777	140	837	151	966	142	849	180	1416
10,000	132	784	138	837	149	966	140	849	176	1419

TABLE 5-63

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

Pressure: 2000 FT      Temperature: 35 C

AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	135	714	136	728	150	844	151	859	197	1566
7,500	135	721	136	728	149	844	151	859	192	1488
8,000	135	731	135	728	148	844	150	859	187	1401
8,500	135	744	133	728	147	844	148	859	182	1317
9,000	135	759	131	728	145	844	146	859	177	1276
9,500	135	774	128	728	143	844	144	859	172	1255
10,000	133	786	125	728	140	844	142	859	167	1217

TABLE 5-64

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT      TEMPERATURE: -25 C  
AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	116	625	150	992	153	1060	137	811	190	1863
7,500	116	636	149	992	152	1060	136	811	187	1832
8,000	116	648	148	992	151	1060	135	811	183	1791
8,500	116	661	146	992	150	1060	133	811	180	1742
9,000	113	661	145	992	149	1060	132	811	177	1685
9,500	113	675	143	992	147	1060	130	811	173	1626
10,000	113	693	142	992	146	1060	127	811	170	1560

TABLE 5-65

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	124	648	150	886	156	994	145	820	197	1753
7,500	125	663	149	886	155	994	144	820	194	1712
8,000	126	680	148	886	155	994	143	820	190	1660
8,500	127	699	147	886	154	994	141	820	187	1598
9,000	129	727	145	886	152	994	140	820	183	1534
9,500	130	748	143	886	150	994	138	820	180	1505
10,000	125	732	142	886	148	994	135	820	176	1510

TABLE 5-66

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	132	672	146	780	155	891	150	829	195	1547
7,500	133	669	144	780	154	891	149	829	190	1469
8,000	133	702	143	780	153	891	148	829	185	1386
8,500	133	716	142	780	152	891	147	829	180	1306
9,000	132	724	140	780	150	891	145	829	175	1270
9,500	131	732	137	780	148	891	143	829	170	1245
10,000	130	748	134	780	146	891	140	829	165	1205

TABLE 5-67

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 4000 FT      TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	135	670	135	671	148	777	154	838	183	1250
7,500	135	680	134	671	147	777	153	838	177	1171
8,000	135	695	132	671	146	777	152	838	172	1102
8,500	135	709	129	671	144	777	149	838	167	1073
9,000	134	725	126	671	141	777	147	838	162	1040
9,500	132	735	122	671	138	777	145	838	157	995
10,000	131	754	117	671	134	777	141	838	151	975



TABLE 5-68

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	116	591	149	918	152	986	140	797	197	1917
7,500	116	603	147	918	151	986	139	797	194	1882
8,000	114	604	146	918	150	986	137	797	190	1835
8,500	113	617	144	918	149	986	135	797	187	1778
9,000	113	633	143	918	147	986	133	797	183	1717
9,500	113	651	141	918	145	986	131	797	180	1689
10,000	117	699	138	918	143	986	128	797	176	1695

TABLE 5-69  
VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)  
PRESSURE: 6000 FT    TEMPERATURE: -5 C  
AIRCRAFT - AH-1J (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	125	616	149	819	155	924	148	804	195	1609
7,500	126	631	148	819	155	924	147	804	190	1533
8,000	128	654	146	819	154	924	145	804	185	1448
8,500	130	683	144	819	152	924	143	804	180	1369
9,000	129	696	142	819	150	924	141	804	175	1336
9,500	124	686	140	819	148	924	139	804	170	1309
10,000	124	703	137	819	145	924	135	804	165	1278

TABLE 5-70

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	133	641	144	722	156	850	153	811	181	1226
7,500	133	654	143	722	155	850	152	811	176	1150
8,000	133	666	141	722	153	850	150	811	171	1085
8,500	132	674	139	722	151	850	148	811	165	1055
9,000	130	684	136	722	149	850	146	811	160	1018
9,500	130	704	132	722	146	850	143	811	155	982
10,000	130	730	129	722	142	850	139	811	150	960

TABLE 5-71

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 6000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

LOAD RANGE	MAX. CONTINUOUS POWER		MAX. POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
1000	133	615	146	710	157	819	167	957
1100	130	615	144	710	155	819	162	931
1200	127	615	142	710	152	819	156	867
1300	123	615	139	710	151	819	151	826
1400	119	615	135	710	147	819	146	804
1500	113	615	131	710	143	819	140	789
1600	107	615	127	710	139	819	135	778

TABLE 5-72

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)  
(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	116	560	147	850	151	916	142	786	195	1780
7,500	114	562	146	850	150	916	141	786	190	1706
8,000	113	575	144	850	148	916	139	786	185	1621
8,500	113	592	142	850	146	916	137	786	180	1542
9,000	116	632	140	850	144	916	134	786	175	1505
9,500	117	662	137	850	142	916	131	786	170	1477
10,000	117	688	134	850	139	916	128	786	165	1431

TABLE 5-73

## VELOCITY LIMITS TABLE

(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	126	507	147	753	154	853	150	791	180	1268
7,500	128	611	145	753	153	853	149	791	175	1191
8,000	130	638	143	753	151	853	147	791	170	1128
8,500	129	647	141	7	149	853	144	791	165	1104
9,000	124	642	138	753	147	853	142	791	159	1057
9,500	123	662	135	753	143	853	138	791	154	1017
10,000	124	699	131	753	140	853	135	791	149	993

TABLE 5-74

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	134	607	141	660	152	755	156	797	165	930
7,500	133	619	140	660	150	755	154	797	160	879
8,000	131	626	137	660	148	755	151	797	155	843
8,500	130	639	133	660	145	755	149	797	149	799
9,000	130	663	130	660	142	755	145	797	144	779
9,500	129	684	125	660	137	755	141	797	138	764
10,000	126	704	120	660	133	755	137	797	133	753

TABLE 5-75

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 8000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	135	601	126	558	143	640	159	803	151	718
7,500	135	615	123	558	140	648	156	803	145	690
8,000	133	628	119	558	136	648	154	803	139	669
8,500	132	644	113	558	132	648	150	803	134	658
9,000	130	666	107	558	128	648	145	803	128	653
9,500	128	689	96	558	122	648	141	803	123	652
10,000	127	718	82	558	115	648	136	803	117	657



TABLE 5-76

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: -25 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	113	522	145	786	150	846	144	777	180	1401
7,500	113	536	143	786	148	846	142	777	175	1323
8,000	113	553	141	786	146	846	140	777	170	1259
8,500	117	595	139	786	143	846	138	777	165	1232
9,000	118	625	136	766	141	846	135	777	159	1180
9,500	117	647	132	786	137	846	131	777	154	1133
10,000	115	668	128	786	134	846	127	777	149	1102

TABLE 5-77

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: -5 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)	VEL (KTS)	F.O.F. (LBS/HR)
7,000	128	569	145	698	153	788	152	781	164	961
7,500	130	593	143	698	150	788	150	781	159	901
8,000	124	564	141	698	148	788	148	781	153	864
8,500	124	600	137	698	145	788	145	781	148	820
9,000	123	623	133	698	142	788	141	781	143	801
9,500	123	658	129	698	137	788	137	781	137	763
10,000	121	679	124	698	133	788	133	781	132	769

TABLE 5-78

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 15 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS HEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	133	574	138	600	149	690	157	786	148	686
7,500	131	562	134	600	146	690	154	786	143	658
8,000	130	597	131	600	143	690	152	786	137	642
8,500	130	623	126	600	139	690	148	786	132	633
9,000	127	640	121	600	134	690	144	786	126	628
9,500	126	664	114	600	130	690	139	786	120	629
10,000	124	691	106	600	124	690	134	786	115	636

TABLE 5-79

VELOCITY LIMITS TABLE  
(INCLUDING FUEL FLOW RATES)

PRESSURE: 10000 FT TEMPERATURE: 35 C

AIRCRAFT - AH-1S (COBRA)

(WITH K747 BLADES)

GROSS WEIGHTS (LBS)	LONG RANGE		MAX CONTINUOUS POWER		MAX POWER (ENGINE)		TRANSMISSION LIMITS		VELOCITY NEVER EXCEED	
	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)	VEL (KTS)	F.F. (LBS/HR)
7,000	135	572	118	500	138	590	160	790	133	560
7,500	133	584	113	500	134	590	157	790	127	552
8,000	131	602	107	500	129	590	152	790	121	549
8,500	129	623	94	500	124	590	148	790	115	553
9,000	128	650	85	500	117	590	143	790	109	561
9,500	126	678	0	500	108	590	138	790	104	573
10,000	124	711	0	500	95	590	132	790	98	576

APPENDIX A  
FUNCTIONS FOR CALCULATING BASIC FUEL FLOW

## 1. AH-1S With 540 Blades

There are four functions that can be used to calculate the basic fuel flow for the AH-1S helicopter with 540 blades. In order to use the functions the following data is needed:

1. Flight Mode
2. Temperature
3. Pressure (altitude)
4. Gross weight

Which of the four functions will be used depends on the flight mode. The first function is for HIGE (Hover In Ground Effect).

$$FF (HIGE) = f (TEMP, ALT, GW)$$

The second function is for HOGE (Hover Out of Ground Effect).

$$FF (HOGE) = f (TEMP, ALT, GW)$$

The third function is for NOE (Nap of the Earth).

$$FF (NOE) = f (TEMP, ALT, GW)$$

The fourth function is for Forward Flight.

$$FF (Forward Flight) = f (AS, TEMP, ALT, GW)$$

The equation for FF (HIGE) is:

$$\begin{aligned} FF (HIGE) = & A (ALT) + B (TEMP) + C (GW) + D (ALT)(TEMP) \\ & + E (ALT) (GW) + F (TEMP) (GW) \\ & + G (ALT) (TEMP) (GW) + K \end{aligned}$$

Where ALT is the altitude, TEMP is the temperature and GW is the gross weight and the constants have the following values:

$$A = -1.66165126 \times 10^{-2}$$

$$E = 1.44767567 \times 10^{-6}$$

$$B = 4.82472397 \times 10^{-1}$$

$$F = 5.30745019 \times 10^{-5}$$

$$C = 5.21285608 \times 10^{-2}$$

$$G = 1.10161161 \times 10^{-8}$$

$$D = -9.35247708 \times 10^{-5}$$

$$K = 2.03834412 \times 10^2$$

The equation for FF (HIGE) is exactly the same form as FF (HIGE). A new set of values for the constants is used. These values are:

$$\begin{array}{ll} A = -2.90346476 \times 10^{-2} & E = 3.22703082 \times 10^{-6} \\ B = 1.52122095 \times 10^{-1} & F = 9.13750846 \times 10^{-5} \\ C = 6.09984472 \times 10^{-2} & G = 3.62607442 \times 10^{-8} \\ D = -2.61930705 \times 10^{-4} & K = 1.97367393 \times 10^2 \end{array}$$

The equation for FF (NOF) is once again the same as FF (HIGE). The new values for the constants are:

$$\begin{array}{ll} A = -3.63968094 \times 10^{-2} & E = 3.90169123 \times 10^{-6} \\ B = 1.22749114 \times 10^{-1} & F = 5.93606383 \times 10^{-5} \\ C = 4.26501855 \times 10^{-2} & G = 6.14249815 \times 10^{-5} \\ D = -4.38479885 \times 10^{-4} & K = 2.7942012 \times 10^2 \end{array}$$

For the Forward Flight modes the form of the equation is:

$$\begin{aligned} FF = & A(AS) + B(AS^2) + C(AS^3) + D(TEMP) + E(GW) + F(ALT) + G(AS^3)(TEMP) \\ & + H(AS^2)(TEMP) + I(AS)(TEMP) + J(AS^3)(GW) + K(AS^2)(GW) \\ & + L(AS)(GW) + M(AS^3)(ALT) + N(AS^2)(ALT) + O(AS)(ALT) + P(TEMP)(GW) \\ & + Q(TEMP)(ALT) + R(GW)(ALT) + S(TEMP)(GW)(ALT) + T \end{aligned}$$

Where AS is the air speed in kts and the values of the constants are:

$$\begin{array}{ll} A = 1.50685422 \times 10 & K = 1.71317013 \times 10^{-5} \\ B = -1.55481091 \times 10^{-1} & L = -1.98433543 \times 10^{-3} \\ C = 5.86834823 \times 10^{-4} & M = -9.37599909 \times 10^{-9} \\ D = -7.6388835 \times 10^{-2} & N = 2.53030319 \times 10^{-6} \\ E = 7.97999874 \times 10^{-2} & O = -2.83347348 \times 10^{-4} \\ F = -3.58666768 \times 10^{-2} & P = 1.19589991 \times 10^{-4} \\ G = -2.38296428 \times 10^{-6} & Q = 4.38017178 \times 10^{-5} \\ H = 3.36616439 \times 10^{-4} & R = 4.39241603 \times 10^{-6} \\ I = -2.54414231 \times 10^{-2} & S = 7.10561482 \times 10^{-9} \\ J = -3.85242283 \times 10^{-8} & T = -3.63953857 \times 10 \end{array}$$

These functions allow anyone with a simple calculator to figure the fuel flow of the aircraft and bypass both looking up the values and interpolating for points in between the data points in the tables.

The above equations calculate the basic fuel flow for the COBRA helicopter with the following accuracies:

FF (HIGE) - 99.66%

FF (HOGF) - 98.77%

FF (NOE) - 97.21%

FF (Forward Flight) - 99.01%



## 2. AH-1S With 747 (KAMAN) Blades

There are four functions that can be used to calculate the basic fuel flow for the AH-1S helicopter with 747 blades. In order to use the functions the following data is needed:

1. Flight Mode
2. Temperature
3. Pressure (altitude)
4. Gross weight

Which of the four functions will be used depends on the flight mode. The first function is for HIGE (Hover In Ground Effect).

$$FF (HIGE) = f (TEMP, ALT, GW)$$

The second function is for HOGE (Hover Out of Ground Effect).

$$FF (HOGE) = f (TEMP, ALT, GW)$$

The third function is for NOE (Nap of the Earth).

$$FF (NOE) = f (TEMP, ALT, GW)$$

The fourth function is for Forward Flight.

$$FF (Forward Flight) = f (AS, TEMP, ALT, GW)$$

The equation for FF (HIGE) is:

$$\begin{aligned} FF (HIGE) = & A (ALT) + B (TEMP) + C (GW) + D (ALT)(TEMP) \\ & + E (ALT) (GW) + F (TEMP) (GW) \\ & + G (ALT) (TEMP) (GW) + K \end{aligned}$$

Where ALT is the altitude, TEMP is the temperature and GW is the gross weight and the constants have the following values:

$A = -1.60887346 \times 10^{-2}$	$E = 1.39153241 \times 10^{-6}$
$B = 5.82819588 \times 10^{-1}$	$F = 4.23413876 \times 10^{-5}$
$C = 5.26286364 \times 10^{-2}$	$G = 1.26031188 \times 10^{-8}$
$D = -1.07432675 \times 10^{-4}$	$K = 1.99337517 \times 10^2$

The equation for FF (HIGE) is exactly the same form as FF (HIGE). A new set of values for the constants is used. These values are:

$$\begin{aligned} A &= -2.13679995 \times 10^{-2} & E &= 2.0951737 \times 10^{-6} \\ B &= 8.78952071 \times 10^{-2} & F &= 9.54136631 \times 10^{-5} \\ C &= 5.88565432 \times 10^{-2} & G &= 9.88199178 \times 10^{-9} \\ D &= -7.20887101 \times 10^{-5} & K &= 2.08704376 \times 10^{-2} \end{aligned}$$

The equation for FF (NOE) is once again the same as FF (HIGE). The new values for the constants are:

$$\begin{aligned} A &= -2.1013048 \times 10^{-2} & E &= 1.98644575 \times 10^{-5} \\ B &= 7.70763941 \times 10^{-2} & F &= 9.03599575 \times 10^{-5} \\ C &= 4.906803 \times 10^{-2} & G &= 1.13212274 \times 10^{-8} \\ D &= -8.22100073 \times 10^{-5} & K &= 2.21582085 \times 10^{-2} \end{aligned}$$

For the Forward Flight modes the form of the equation is:

$$\begin{aligned} FF &= A(AS) + B(AS^2) + C(AS^3) + D(TEMP) + E(GW) + F(ALT) + G(AS^3)(TEMP) \\ &+ H(AS^2)(TEMP) + I(AS)(TEMP) + J(AS^3)(GW) + K(AS^2)(GW) \\ &+ L(AS)(GW) + M(AS^3)(ALT) + N(AS^2)(ALT) + O(AS)(ALT) + P(TEMP)(GW) \\ &+ Q(TEMP)(ALT) + R(GW)(ALT) + S(TEMP)(GW)(ALT) + T \end{aligned}$$

Where AS is the air speed in kts and the values of the constants are:

$$\begin{aligned} A &= 5.13174047 \times 10 & K &= 6.1180006 \times 10^{-5} \\ B &= -5.60409598 \times 10^{-1} & L &= -5.97067177 \times 10^{-3} \\ C &= 2.02428008 \times 10^{-3} & M &= -2.86284552 \times 10^{-8} \\ D &= 7.98234731 \times 10^{-1} & N &= 7.73540614 \times 10^{-6} \\ E &= 1.98506402 \times 10^{-1} & O &= -7.61565207 \times 10^{-4} \\ F &= -3.59612331 \times 10^{-3} & P &= 3.87100608 \times 10^{-5} \\ G &= -1.5157036 \times 10^{-6} & Q &= 3.97515878 \times 10^{-5} \\ H &= 1.44432976 \times 10^{-1} & R &= 2.22375186 \times 10^{-6} \\ I &= -1.51503682 \times 10^{-2} & S &= 1.12191019 \times 10^{-9} \\ J &= -1.93501698 \times 10^{-7} & T &= -1.10774542 \times 10^{-3} \end{aligned}$$

These functions allow anyone with a simple calculator to figure the fuel flow of the aircraft and bypass both looking up the values and interpolating for points in between the data points in the tables.

The above equations calculate the basic fuel flow for the COBRA helicopter with the following accuracies:

FF (HIGE) - 99.67%

FF (HOGE) - 99.43%

FF (NOE) - 99.32%

FF (Forward Flight) - 99.03%

APPENDIX B  
FUNCTION FOR CALCULATING DELTA FUEL FLOW FOR DRAG

## 1. AH-1S WITH 540 BLADES

The function below will calculate the delta fuel flow for drag for the AH-1S helicopter with 540 blades. Recall from the discussion in chapter three that this value is added to the basic fuel flow value whenever drag is increasing the rate of fuel flow.\*

In order to use the function the following data is needed:

1. Air Speed (AS)
2. Equivalent Square Footage of Drag (SQ)
3. Temperature (TEMP) in degrees centigrade
4. Altitude (ALT) in feet above sea level

That is:

$$FF(\text{Drag}) = f(\text{AS}, \text{SQ}, \text{TEMP}, \text{ALT})$$

The equation for FF (Drag) is:

$$\begin{aligned} FF(\text{Drag}) = & A(\text{AS}) + B(\text{AS}^2) + C(\text{AS}^3) + D(\text{TEMP}) + E(\text{SQ}) + F(\text{ALT}) \\ & + G(\text{AS}^3)(\text{TEMP}) + H(\text{AS}^2)(\text{TEMP}) + I(\text{AS})(\text{TEMP}) + J(\text{AS}^3)(\text{SQ}) + K(\text{AS}^2)(\text{SQ}) \\ & + L(\text{AS})(\text{SQ}) + M(\text{AS}^3)(\text{ALT}) + N(\text{AS}^2)(\text{ALT}) + O(\text{AS})(\text{ALT}) + P(\text{TEMP})(\text{SQ}) \\ & + Q(\text{TEMP})(\text{ALT}) + R(\text{SQ})(\text{ALT}) + S(\text{SQ})(\text{ALT})(\text{TEMP}) + T \end{aligned}$$

Where the constants have the following values:

$A = -2.46757969 \times 10^{-1}$	$K = -1.82550744 \times 10^{-3}$
$B = 6.09553629 \times 10^{-3}$	$L = 1.00036621 \times 10^{-1}$
$C = -9.67902588 \times 10^{-5}$	$M = -2.20381685 \times 10^{-9}$
$D = 3.54602933 \times 10^{-1}$	$N = 2.62352064 \times 10^{-7}$
$E = 2.7508316$	$O = -1.86301768 \times 10^{-5}$
$F = 6.0146426 \times 10^{-3}$	$P = -1.05946873 \times 10^{-1}$
$G = 4.18149412 \times 10^{-7}$	$Q = -1.86343659 \times 10^{-5}$
$H = -1.64519062 \times 10^{-4}$	$R = -7.79591537 \times 10^{-4}$
$I = 1.45574398 \times 10^{-2}$	$S = 3.8200393 \times 10^{-6}$
$J = 2.27796681 \times 10^{-5}$	$T = -2.97340794 \times 10$

---

\*There is no delta fuel flow for drag for HIGE, HOGE or NOE flight.

This equation calculates the delta fuel flow for drag value with an accuracy of 99.66%. It should be noted that in some instances the computed value will be negative. If this occurs, zero (0) should be used as the value for delta fuel flow.

## 2. AH-1S WITH 747 (KAMAN) BLADES

The function below will calculate the delta fuel flow for drag for the AH-1S helicopter with 747 blades. Recall from the discussion in chapter three that this value is added to the basic fuel flow value whenever drag is increasing the rate of fuel flow.\*

In order to use the function the following data is needed:

1. Air Speed (AS)
2. Equivalent Square Footage of Drag (SQ)
3. Temperature (TEMP) in degrees centigrade
4. Altitude (ALT) in feet above sea level

That is:

$$FF(\text{Drag}) = f(\text{AS}, \text{SQ}, \text{TEMP}, \text{ALT})$$

The equation for FF (Drag) is:

$$\begin{aligned} FF(\text{Drag}) = & A(\text{AS}) + B(\text{AS}^2) + C(\text{AS}^3) + D(\text{TEMP}) + E(\text{SQ}) + F(\text{ALT}) \\ & + G(\text{AS}^3)(\text{TEMP}) + H(\text{AS}^2)(\text{TEMP}) + I(\text{AS})(\text{TEMP}) + J(\text{AS}^3)(\text{SQ}) + K(\text{AS}^2)(\text{SQ}) \\ & + L(\text{AS})(\text{SQ}) + M(\text{AS}^3)(\text{ALT}) + N(\text{AS}^2)(\text{ALT}) + O(\text{AS})(\text{ALT}) + P(\text{TEMP})(\text{SQ}) \\ & + Q(\text{TEMP})(\text{ALT}) + R(\text{SQ})(\text{ALT}) + S(\text{SQ})(\text{ALT})(\text{TEMP}) + T \end{aligned}$$

Where the constants have the following values:

$A = -2.24462211 \times 10^{-1}$	$K = -2.09308497 \times 10^{-3}$
$B = 5.87719353 \times 10^{-3}$	$L = 1.20056152 \times 10^{-1}$
$C = -9.5738912 \times 10^{-1}$	$M = -3.12104204 \times 10^{-9}$
$D = 2.63016146 \times 10^{-1}$	$N = 4.89308292 \times 10^{-7}$
$E = 2.40192413$	$O = -3.58912512 \times 10^{-5}$
$F = 6.57712383 \times 10^{-3}$	$P = -1.03964706 \times 10^{-1}$
$G = 6.04509751 \times 10^{-7}$	$Q = -1.75383411 \times 10^{-5}$
$H = -2.12748444 \times 10^{-4}$	$R = -7.99062436 \times 10^{-4}$
$I = 1.83473714 \times 10^{-2}$	$S = 3.35921874 \times 10^{-6}$
$J = 2.38053908 \times 10^{-5}$	$T = -3.12774525 \times 10$

---

\*There is no delta fuel flow for drag for HIGE, HOGE or NOE flight.

This equation calculates the delta fuel flow for drag value with an accuracy of 99.66%. It should be noted that in some instances the computed value will be negative. If this occurs, zero (0) should be used as the value for delta fuel flow.



APPENDIX C

FUNCTION FOR CALCULATING GROUND IDLE FUEL FLOW

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The function below will calculate the ground idle fuel flow rate for the AH-1S helicopter. In order to use the function the following data is needed:

1. Temperature (TEMP) in degrees centigrade.
2. Altitude (ALT) in feet above sea level.

That is:

$$FF (Idle) = f (TEMP, ALT)$$

The equation, for FF (Idle) is:

$$FF (Idle) = A(TEMP) + B(ALT) + C(TEMP)(ALT) + D(TEMP^2) + E(ALT^2) + F$$

Where the constants have the following values:

$A = 4.31250222 \times 10^{-2}$	$D = 5.20833513 \times 10^{-9}$
$B = -8.81775992 \times 10^{-3}$	$E = -1.11681478 \times 10^{-9}$
$C = 6.49999595 \times 10^{-6}$	$F = 3.90269852 \times 10^2$

This equation calculates the ground idle fuel flow rate with an accuracy of 99.98%. This equation is applicable for both 540 blade and 747 blade configurations.

APPENDIX D

FUNCTIONS FOR CALCULATING GROSS WEIGHT LIMITS FOR TAKEOFF

## 1. AH-1S WITH 540 BLADES

The functions given below will calculate the gross weight limits for take off for the AH-1S helicopter with 540 blades. Each of the functions is of the same basic form with the values of the constants changing depending on which take off criteria is being used. In all cases the Structural Gross Weight Limit of the AH-1S helicopter is 10,000 lbs.

In order to use the functions the following data is needed:

1. Temperature (TEMP) in degrees centigrade
2. Altitude (ALT) in feet above sea level

That is:

$$GW (Limit) = f (TEMP, ALT)$$

The basic equation for GW (Limit) is:

$$GW (Limit) = A(TEMP) + B(ALT) + C(TEMP)(ALT) + D$$

For take off criteria #1 the equation must be used twice, once using the engine limit constants and once using the transmission limit constants. For take off criteria #1 the constants for engine limits are:

$$\begin{aligned} A &= -7.075072 \times 10 & C &= 1.24214387 \times 10^{-3} \\ B &= -4.2338929 \times 10^{-1} & D &= 1.31936464 \times 10^4 \end{aligned}$$

For take off criteria #1 the constants for transmission limits are:

$$\begin{aligned} A &= -9.80619085 & C &= -3.58428537 \times 10^{-4} \\ B &= -1.18722143 \times 10^{-1} & D &= 1.05521023 \times 10^4 \end{aligned}$$

For take off criteria #2 two checks must also be made. The constants for engine limits, take off criteria #2 are:

$$\begin{aligned} A &= -6.82688026 \times 10 & C &= 1.18342783 \times 10^{-3} \\ B &= -3.93181413 \times 10^{-1} & D &= 1.22518319 \times 10^4 \end{aligned}$$

For take off criteria #2 the constants for transmission limits are:

$$\begin{aligned} A &= -8.69428587 & C &= -2.56142837 \times 10^{-4} \\ B &= -1.01776424 \times 10^{-1} & D &= 1.00245903 \times 10^4 \end{aligned}$$

Also for take off criteria #3 two checks must be made. The constants for engine limits, take off criteria #3 are:

$$A = -8.31099958 \times 10$$

$$C = 1.46299973 \times 10^{-3}$$

$$B = -4.88272127 \times 10^{-1}$$

$$D = 1.52255022 \times 10^4$$

For take off criteria #3 the constants for transmission limits are:

$$A = -1.15316675 \times 10$$

$$C = -2.51499874 \times 10^{-4}$$

$$B = -1.31067501 \times 10^{-1}$$

$$D = 1.21174083 \times 10^4$$

This equation with the various sets of constants gives results that are 99.25% accurate or better.

## 2. AH-1S WITH 747 (KAMAN) BLADES

The functions given below will calculate the gross weight limits for take off for the AH-1S helicopter with 747 blades. Each of the functions is of the same basic form with the values of the constants changing depending on which take off criteria is being used. In all cases the Structural Gross Weight Limit of the AH-1S helicopter is 10,000 lbs.

In order to use the functions the following data is needed:

1. Temperature (TEMP) in degrees centigrade
2. Altitude (ALT) in feet above sea level

That is:

$$GW (\text{Limit}) = f (\text{TEMP}, \text{ALT})$$

The basic equation for GW (Limit) is:

$$GW (\text{Limit}) = A(\text{TEMP}) + B(\text{ALT}) + C(\text{TEMP})(\text{ALT}) + D$$

For take off criteria #1 the equation must be used twice, once using the engine limit constants and once using the transmission limit constants. For take off criteria #1 the constants for engine limits are:

$$\begin{aligned} A &= -7.63214264 \times 10 & C &= 1.31078577 \times 10^{-3} \\ B &= -4.40507483 \times 10^{-1} & D &= 1.37294165 \times 10^4 \end{aligned}$$

For take off criteria #1 the constants for transmission limits are:

$$\begin{aligned} A &= -9.30928552 & C &= -1.33642883 \times 10^{-4} \\ B &= -1.03992496 \times 10^{-1} & D &= 1.08000581 \times 10^4 \end{aligned}$$

For take off criteria #2 two checks must also be made. The constants for engine limits, take off criteria #2 are:

$$\begin{aligned} A &= -7.10316748 \times 10 & C &= 1.22300153 \times 10^{-3} \\ B &= -4.05215003 \times 10^{-1} & D &= 1.26269083 \times 10^4 \end{aligned}$$

For take off criteria #2 the constants for transmission limits are:

$$\begin{aligned} A &= -8.23000026 & C &= -9.2999966 \times 10^{-5} \\ B &= -9.05135721 \times 10^{-2} & D &= 1.02332928 \times 10^4 \end{aligned}$$

Also for take off criteria #3 two checks must be made. The constants for engine limits, take off criteria #3 are:

$$A = -8.35283289 \times 10$$

$$C = 1.49449974 \times 10^{-3}$$

$$B = -4.87840336 \times 10^{-1}$$

$$D = 1.52207723 \times 10^4$$

For take off criteria #3 the constants for transmission limits are:

$$A = -1.19580952 \times 10$$

$$C = -1.68214285 \times 10^{-4}$$

$$B = -1.31841065 \times 10^{-1}$$

$$D = 1.21164093 \times 10^4$$

This equation with the various sets of constants gives results that are 99.20% accurate or better.

APPENDIX E  
SHORT DESCRIPTION OF COBRA DATA SOURCE



DRDAV-EQA(A)

SUBJECT: Short description of AH-1S performance data provided to  
TRADOC Systems Analysis Activity (TRASANA)

MFR:

1. References:

a. Engineering flight test, AH-1G Helicopter (Huey Cobra), Phase D, Part 2, final report. USAASTA Proj. No.66-06, Nov 1970.

b. Determination of the Effects of Rotor Blade Compressibility on the Performance of the UH-1F; FTC-TR-65-17

c. Letter, DRDAV-PDAO, To: Kaman Aerospace Corp. Subject: Contract DAAJ01-77-C-0317, Basic Data for Use in Preparation of K747-003 Blade, AH-1S (PROD) Operators Manual Performance Charts; 19 Aug 1977.

d. Operator's Manual, Army Model AH-1G Helicopter, TM55-1520-221-10, Dec. 75.

e. Operator's Manual, Army AH-1S (Prod) Helicopter, TM55-1520-236-10, Apr 77.

2. The performance data presented to TRASANA is the result of combining the helicopter power required, engine power available and engine fuel flow characteristics. The AH-1G, AH-1S (540 blades) and AH-1S (K747 blades) power required was calculated for the required altitude and temperature combinations from a non-dimensional representation of engine power required (coefficient of power) v.s. gross weight (coefficient of thrust) and true airspeed (advance ratio). The non-dimensional engine power required for the AH-1G and AH-1S (540 blades) was extracted from reference 1a. The drag difference accounted for between the AH-1G and AH-1S (540 blades), was +6.5 ft<sup>2</sup> equivalent flat plate area. This extra drag of the AH-1S (540 blades) accounts for +2.5 ft<sup>2</sup> due to the different nose configuration and +4 ft<sup>2</sup> due to the flat glass canopy configuration of the AH-1S. The non-dimensional engine power required for the AH-1S (K747 blades) was extracted from reference 1c. All performance in ground effect represents a 2 foot skid height. A temperature dependent correction, based on the method outlined in reference b., was made to the power required to account for compressibility which could not be accounted for in the non-dimensional representation.

3. The T53-L-13 engine power available to the AH-1G (which was used in combination with the power required to find helicopter take-off and speed limits) was used, as a function of altitude and temperature, from reference 1a. The T53-L-703 engine power available to the AH-1S (540 blades) and AH-1S (K747 blades) was calculated for the various altitude and temperature combinations, by the use of the Lycoming T53-L-703 engine specification computer program. Proper engine installation effects were taken into account.

DRDAV-EQA(A)

SUBJECT: Short description of AH-1S performance data provided to  
TRADOC Systems Analysis Activity (TRASANA)

4. The engine fuel flow at a particular altitude and temperature combination was derived from a representative referred fuel flow as a function of referred engine power. The referred fuel flow curve for the T53-L-13 engine (AH-1G), was taken from reference 1a. The referred fuel flow curve for the T53-L-703 engine (AH-1S) was constructed by use of the Lycoming T53-L-703 engine specification computer program which calculated fuel flows at various engine power levels and atmospheric conditions. The fuel flows were then corrected to reflect 5% conservatism. A referred parameter is one which is divided by temperature and pressure ratios in order to represent all atmospheric conditions by one function.

5. The never exceed speeds (Vn.e.) were calculated from those shown graphically in references 1d and 1e for the AH-1G and AH-1S respectively.

6. The Structural Gross Weight limit of the AH-1G is 9500 lbs. The Structural Gross Weight limit of the AH-1S is 10000 lbs.

*James A. O'Malley*  
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Aero Engr.

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